

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

REPORT
OF THE
DOMINION EXPERIMENTAL FARMS

FOR THE
FISCAL YEAR ENDING MARCH 31, 1919

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
J. DE LABROQUERIE TACHÉ
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1920

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OTTAWA, March 31, 1919.

The Honourable
The Minister of Agriculture,
Ottawa.

SIR,—I have the honour to submit herewith, for your approval, the thirty-second annual report of the work carried on by the Experimental Farms Branch of the Department of Agriculture, during the year ending March 31, 1919.

This report is merely a summary of the year's operations but an endeavour has been made to prepare it in such a way that it will be found both readable and giving a very fair general idea of the lines of activity pursued.

I have the honour to be, sir,

Your obedient servant,

J. H. GRISDALE,
Director, Dominion Experimental Farms

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ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1919

REPORT OF THE DIRECTOR

J. H. GRISDALE, B.Agr., D.Sc.A.

FIELD CROP AND LIVE-STOCK NOTES FOR 1918.

In the season of 1918, the early spring produced favourable conditions for seed-
ing to be completed in excellent time, and the area sown to wheat, viz., 17,353,902
acres, was the largest on record.

In the West, however, May was exceptionally cold, the heavy frost retarding
growth. The drought of June and July caused considerable damage, while heavy
frosts from July 23 to 25 seriously affected the wheat in the blossom stage.

In the Maritime Provinces, Quebec and Ontario, conditions were generally
favourable and the harvest, especially in Ontario, was good. The total value of
Canada's field crops for the year was \$1,367,909,970 which is again the highest on
record and compares with \$1,144,636,450, in 1917.

The area under root and fodder crops amounted to 12,321,351 acres as compared
with 9,590,568 acres in 1917. The total estimated yield of potatoes for 1918 was
104,364,200 bushels, being much greater than the yield of 1917 and far exceeding the
previous record of over 99 million bushels in 1909.

In the following tables, details are given of the yields and values of the principal
field crops for 1917 and 1918. In table 3 the numbers of the various classes of live-
stock in Canada are given for the period of 1914-18.

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TABLE I.—Comparison of Yields and Prices obtained for the years 1917 and 1918.

Crop.	Average Yield per acre.		Average Yield per bush.		Total Yield.	
	1917.	1918.	1917.	1918.	1917.	1918.
	bush.	bush.	\$	\$	bush.	bush.
Fall wheat.....	21.50	19.00	2.08	2.08	15,533,450	7,942,800
Spring wheat.....	15.50	10.75	1.93	2.02	218,209,400	181,132,550
All wheat.....	15.75	11.00	1.94	2.02	233,742,850	189,075,350
Oats.....	30.25	28.75	0.69	0.78	403,009,800	426,312,500
Barley.....	23.00	24.50	1.08	1.00	55,057,750	77,287,240
Rye.....	18.25	15.25	1.62	1.49	3,857,200	8,504,400
Peas.....	15.25	13.25	3.54	2.54	3,026,340	3,099,400
Beans.....	13.75	15.50	7.45	5.41	1,274,000	3,563,380
Buckwheat.....	18.00	20.75	1.46	1.58	7,149,400	11,375,500
Mixed grains.....	32.50	38.75	1.16	1.14	16,157,080	35,662,300
Flax.....	6.50	5.75	2.65	3.13	5,934,900	6,055,200
Corn for husking.....	33.00	56.75	1.84	1.75	7,762,700	14,214,200
Potatoes.....	121.50	142.00	1.01	0.98	79,892,000	104,364,200
Turnips, mangels, etc.....	290.75	377.50	0.46	0.43	63,451,000	122,699,600
Hay and clover.....	tons 1.66	tons 1.40	per ton 10.33	per ton 16.25	tons 13,684,700	tons. 14,772,300
Fodder corn.....	7.34	9.50	5.14	6.15	2,690,370	4,787,500
Sugar beets.....	8.40	10.00	6.75	10.25	117,600	180,000
Alfalfa.....	2.39	2.25	11.59	17.84	262,400	446,400

TABLE 2.—Comparison of Eastern Canada, Prairie Provinces and British Columbia as to Yields and Prices obtained.

	Eastern Provinces.				Prairie Provinces.				British Columbia.			
	Average Yield per acre.		Average Price obtained.		Average Yield per acre.		Average Price obtained.		Average Yield per acre.		Average Price obtained.	
	1917.	1918.	1917.	1918.	1917.	1918.	1917.	1918.	1917.	1918.	1917.	1918.
	bush.	bush.	\$	\$	bush.	bush.	\$	\$	bush.	bush.	\$	\$
Fall wheat.....	21.50	19.50	2.09	2.09	20.07	15.17	2.00	1.93	31.75	24.75	1.92	2.15
Spring wheat.....	18.93	20.21	2.17	2.16	15.54	10.18	1.91	2.28	28.50	22.00	2.00	2.08
Oats.....	30.87	37.58	0.78	0.84	29.78	23.73	0.63	0.71	53.75	39.75	0.90	1.00
Barley.....	27.04	33.74	1.25	1.26	21.83	20.95	1.02	0.90	29.25	26.50	1.28	1.47
Peas.....	15.11	12.89	3.56	2.57	17.34	19.38	3.16	1.50	23.75	21.50	2.46	3.00
Rye.....	17.49	16.11	1.68	1.66	18.74	15.01	1.59	1.43	.....	30.00	.....	2.07
Flax.....	10.21	11.99	3.54	3.51	6.41	5.53	2.63	3.11	.....	.....	.....	.....
Potatoes.....	116.70	144.49	1.09	1.02	132.86	123.43	0.80	0.80	166.55	228.00	0.69	0.97
Turnips, etc.....	303.50	399.33	0.43	0.48	181.70	219.28	0.80	0.66	344.58	422.00	0.64	0.60
	tons.	tons.			tons.	tons.			tons.	tons.		
Hay and clover...	1.69	1.43	10.15	16.19	1.42	0.97	10.68	14.14	1.85	1.90	17.60	33.25
Sugar beets.....	8.40	10.00	6.70	10.25	.....	.....	.....	.....	.....	.....	.....	.....
Fodder corn.....	7.74	9.73	5.00	6.01	2.82	5.57	7.66	10.50	7.00	10.10	15.00	10.00
Alfalfa.....	2.77	2.28	9.98	15.63	1.96	1.91	11.47	20.49	2.58	3.25	22.92	32.25

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TABLE 3.—Farm and Live Stock, 1914-18.

Live Stock.	1914.	1915.	1916.	1917.	1918.
Eastern Provinces:—					
Horses.....	1,441,381	1,442,063	1,396,760	1,434,832	1,399,099
Milch cows.....	2,097,586	2,075,750	1,998,318	2,270,837	2,585,285
Other cattle.....	1,904,976	1,848,504	1,727,773	2,103,329	3,501,640
Sheep.....	1,630,714	1,569,488	1,483,065	1,840,054	2,404,319
Swine.....	2,357,128	2,269,029	2,096,832	2,102,506	2,842,507
Western Provinces:—					
Horses.....	1,445,652	1,492,681	1,800,270	1,922,793	2,166,027
Milch cows.....	539,998	553,152	792,797	882,441	907,350
Other cattle.....	1,359,464	1,450,212	1,929,844	2,423,990	2,810,462
Sheep.....	382,331	420,770	493,607	485,446	603,138
Swine.....	1,038,102	804,328	1,340,179	1,479,188	1,407,370
British Columbia:—					
Horses.....	60,705	61,355	61,312	55,124	44,131
Milch cows.....	35,702	37,944	39,318	49,005	50,965
Other cattle.....	99,091	100,439	103,101	191,338	195,165
Sheep.....	45,000	46,404	46,269	43,858	45,291
Swine.....	39,031	38,543	37,829	37,688	39,805

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, from April 1, 1918 to March 31, 1919, giving maximum, minimum, and mean temperature for each month with date of occurrence, also the rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°		Ins.	Ins.	Ins.		Ins.	
April.....	54.28	31.56	22.71	42.91	75.0	28	17.4	19	1.11	3.00	1.41	9	0.30	18
May.....	68.92	45.72	23.19	57.31	85.8	19	28.0	11	1.80	.....	1.80	11	0.53	13
June.....	73.51	50.08	23.43	64.79	89.8	1	36.6	20	3.13	.....	3.13	12	1.23	12
July.....	81.12	58.83	22.29	69.97	96.0	22	47.0	3	3.38	.....	3.38	16	1.42	1
August.....	79.14	56.04	23.10	67.59	92.0	23	43.8	18	2.92	.....	2.92	13	0.67	13
September...	62.51	45.42	17.09	53.96	80.4	2	29.8	30	5.62	.....	5.62	21	2.31	5
October.....	55.42	38.84	16.58	47.13	68.0	28	27.0	8	5.17	.....	5.17	15	1.35	6
November...	41.05	28.90	12.14	34.97	52.0	9 & 10	11.2	26	2.17	3.50	2.52	15	0.89	19
December...	25.75	13.60	12.15	19.67	42.6	23	— 4.8	29	1.34	20.00	3.34	17	0.60	14
January.....	25.15	8.81	16.33	16.97	37.2	17	— 22.0	12	0.77	17.75	2.55	19	0.55	10
February....	25.71	9.50	16.21	17.60	36.0	23	— 8.8	11	0.04	15.50	1.59	7	0.69	14
March.....	34.74	16.76	17.98	25.75	47.0	23 & 26	— 7.8	14	1.78	27.50	4.53	13	1.50	9
									29.23	87.25	37.94	168		

Rain or snow fell on 168 days during the 12 months.

Heaviest rainfall in 24 hours, 2.31 inches on September 5.

Heaviest snowfall in 24 hours, 15.00 inches on March 9.

The highest temperature during the 12 months was, 96.0° on July 27.

The lowest temperature during the 12 months was 22.0° on January 12.

During the growing season rain fell on 9 days in April, 11 days in May, 12 days in June, 16 days in July 13 days in August, and 21 days in September.

February shows the lowest number of days with precipitation, viz. 7.

Total precipitation during the 12 months, 37.94 inches, as compared with, 32.48 inches during 1917-18.

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RAINFALL, Snowfall, and total Precipitation from 1890 to 1918-19, also the average annual amount that has fallen.

Years.	Rainfall.	Snowfall.	Total Precipitation.
1890.....	24.73	64.85	31.22
1891.....	30.19	73.50	37.54
1892.....	23.78	105.00	34.28
1893.....	31.79	72.50	39.04
1894.....	23.05	71.50	30.20
1895.....	27.01	87.50	35.76
1896.....	21.53	99.75	31.50
1897.....	24.18	89.00	33.08
1898.....	24.75	112.25	35.97
1899.....	33.86	77.25	41.63
1900.....	29.48	108.00	40.72
1901.....	29.21	97.25	38.91
1902.....	25.94	101.75	36.10
1903.....	26.43	85.00	34.92
1904.....	25.95	108.75	36.79
1905.....	23.71	87.25	32.42
1906, January 1 to March 31.....	1.90	24.50	4.34
1106-07.....	21.73	72.50	28.94
1907-08.....	24.70	134.75	38.18
1908-09.....	22.13	107.90	32.91
1909-10.....	28.40	61.25	34.51
1910-11.....	18.94	88.25	27.72
1911-12.....	20.12	98.50	29.95
1912-13.....	32.54	106.50	43.18
1913-14.....	21.51	70.25	28.51
1914-15.....	16.77	78.50	24.67
1915-16.....	22.66	130.00	35.65
1916-17.....	24.84	126.50	37.18
1917-18.....	20.90	116.00	32.48
1918-19.....	29.23	87.25	37.94
Total for 29 years and 3 months.....	731.96	2,743.75	1,006.24
Average for 29 years.....	25.24	94.61	34.69

RECORD of Sunshine at the Central Experimental Farm, Ottawa, from April 1, 1918 to March 31, 1919.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April.....	26	4	244.0	8.13
May.....	30	1	227.7	7.34
June.....	29	1	293.0	9.76
July.....	30	1	283.4	9.14
August.....	30	1	279.1	9.00
September.....	26	4	149.6	4.98
October.....	23	8	134.1	4.32
November.....	21	9	80.5	2.68
December.....	19	12	90.9	2.93
January.....	21	10	86.7	2.79
February.....	25	3	138.4	4.94
March.....	21	10	148.3	4.78

Signed,

WILLIAM T. ELLIS,

Observer.

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DISTRIBUTION OF SAMPLES.

The distribution of samples of seed grain, potatoes, flower-seeds, fruit trees and shrubs was again carried on during the past winter from the Central Farm at Ottawa and from the various branch Farms and Stations. The distribution of seed grain was made from Ottawa and of seed grain and potatoes from the branch Farms and Stations.

EXPERIMENTS AT FORT VERMILION, ALTA.

Character of season.—During the month of March the temperature, for the most part, kept well below the zero point. Throughout the month of April, as well, the severe weather prevented any farm operations.

Although some wheat was sown on May 4, seeding commenced in general only on the 8th. On account of the land being so cold, germination was very slow, while a frost about the middle of the month nipped the sprouted grain and set back the vegetables considerably.

The first half of June was very dry, which, along with the snow and frost, resulted in a slow growth throughout the month. Potatoes, however, were doing nicely by the end of the month.

July set in somewhat dry but an unexpected frost on the 20th seriously affected nearly all crops, so much so that many fields of wheat, oats and barley were cut as green feed.

The only real growth made by the root crops and vegetables was in August. The first barley was cut on August 3, oats on the 5th, and Prelude wheat on the 12th.

September throughout was a very fine month enabling the farmers to rush along the harvesting operations, all grain being either threshed or stacked and root crops and potatoes completely harvested by the 25th. A very severe frost of 18° on the 8th stopped all growth.

Cereals.—Seven varieties of wheat tested ranged in yield from Bishop, 66 bushels per acre to Prelude, 34 bushels. Seven varieties of oats yielded from 130 bushels, 20 pounds of Garton's Regenerated Abundance to 79 bushels, 24 pounds of Eighty-Day. Five varieties of six-rowed barley yielded from 60 bushels of Manchurian to 41 bushels, 22 pounds of Success, while the two-rowed variety, Canadian Thorpe, yielded 53 bushels, 36 pounds. Spring rye yielded 49 bushels, 16 pounds per acre, and Fall rye, 36 bushels, 24 pounds. Owing to the severe frosts and unfavourable weather conditions, the yield of peas was very much lower than usual. The Arthur variety yielded 26 bushels per acre and the Prussian Blue, 28 bushels. Flax, although not a common crop in this section of Peace River, gave 1 ton, 1,200 pounds of straw per acre.

Forage crops.—The season of 1918 was rather unfavourable for forage crops at this Station. Not until well towards the end of July did the roots get a real start, most of the growth being made during August. Owing to the alternate freezing and thawing in April, the Meadow fescue suffered a serious set-back, yielding 1 ton, 1,760 pounds per acre for hay production, and a plot, sown for seed, yielded 360 pounds per acre. Alfalfa yielded from 1 ton, 1,420 pounds per acre to 1 ton, 1,030 pounds. Red clover yielded 1 ton, 1,750 pounds per acre and Alsike, 1 ton, 1,450 pounds. Three plots of millet yielded as follows: Siberian, 1 ton, 1,000 pounds, Japanese, 1 ton, 300 pounds, and Common Millet, 1 ton, 1,500 pounds. Brome grass yielded 2 tons, 400 pounds per acre, Timothy, 1 ton, 1,000 pounds, Red Top, 1 ton, 1,100 pounds, and rye-grass 2 tons, 200 pounds, in each case the hay being of fine quality and medium length. Four varieties of field carrots tested, yielded as follows: Ontario Champion, 11 tons, 500 pounds per acre, White Belgian, 14 tons, 1,880 pounds, Improved Short White, 12 tons, 60 pounds, and

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Large White Vosges, 12 tons, 1,500 pounds. Of the five varieties of mangels tested, the yields ranged from Royal Giant, at 16 tons, 1,420 pounds per acre, to Prize Mammoth Long Red at 12 tons. Turnips, three varieties, yielded as follows: Perfection Swede, 16 tons, 1,900 pounds per acre, Hartley's Bronze Top, 23 tons, 1,100 pounds, and Good Luck, 17 tons, 800 pounds, while fall turnips, two varieties, yielded 31 tons, 1,130 pounds of Purple Top Yellow Aberdeen, and 27 tons, 1,600 pounds of White Globe. Only one variety of sugar beets was under test this season, the French Very Rich, yielding 9 tons, 600 pounds per acre.

The flowers, both annual and perennial, had only a short period in which they were in bloom but during that time they made a very fine showing.

TABLE of Meteorological Observations taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1918, to March 31, 1919, showing maximum, minimum, and mean temperature, the highest and lowest for each month with date of occurrence, also rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
April.....	44.80	12.95	31.85	28.87	58.9	30	-11.5	7	.....	0.50	0.05	1	0.05	5
May.....	52.85	26.49	26.36	39.67	69.0	29	11.5	16	0.20	3.00	1.27	7	0.56	1
June.....	67.82	36.39	31.43	52.10	81.0	18	16.0	2	1.21	.....	1.21	7	0.37	11
July.....	70.76	37.80	33.95	54.77	88.9	17	20.0	24	1.26	.....	1.26	7	0.38	5
August.....	69.69	39.88	29.80	54.78	83.9	16	33.0	25	2.77	.....	2.77	15	1.45	17
September...	65.38	27.76	37.62	46.57	79.0	5	14.0	8	0.02	.....	0.02	1	0.02	7
October.....	41.41	13.28	28.13	27.34	66.0	4	-15.5	30	0.08	14.75	1.55	5	1.00	20
November...	22.98	- 3.31	19.67	6.52	45.5	1	-23.5	16	.....	7.50	0.75	5	0.40	29
December...	10.76	-17.52	28.29	- 3.38	37.0	25	-40.0	14	.....	1.25	0.12	2	0.10	11
January.....	13.85	-16.21	30.38	- 1.02	47.9	9	-38.0	20	.....	1.50	0.15	3	0.05	18
February....	4.36	-26.27	30.63	-10.96	26.5	13 & 20	-64.5	25	2.25	0.22	2	0.20	17
March.....	12.28	-24.85	37.13	- 6.29	46.5	22	-48.9	13	1.00	0.09	3	0.05	14
	5.54	31.75	9.46	58

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SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River District, Alberta.

	Mean Tem- perature.	Highest Tem- perature.	Lowest Tem- perature.	Total Precipi- tation.	Heaviest in 24 hours.	Total hours Sunshine.	Average Sunshine per day.
<i>April.</i>	°	°	°	Ins.	Ins.	Hrs.	Hrs.
Ottawa.....	42.91	75.0	17.4	1.41	0.30	244.0	8.13
Fort Vermilion.....	28.87	58.9	-11.5	0.05	0.05	236.0	7.86
<i>May.</i>							
Ottawa.....	57.31	85.8	28.0	1.80	0.53	227.7	7.34
Fort Vermilion.....	39.67	69.0	11.5	1.27	0.56	226.3	7.30
<i>June.</i>							
Ottawa.....	61.79	89.8	36.6	3.13	1.23	293.0	9.76
Fort Vermilion.....	52.10	81.0	16.0	1.21	0.37	263.8	8.78
<i>July.</i>							
Ottawa.....	69.97	96.0	47.0	3.38	1.42	283.4	9.14
Fort Vermilion.....	54.77	88.9	20.0	1.26	0.38	320.0	10.32
<i>August.</i>							
Ottawa.....	67.59	92.0	43.8	2.92	0.67	279.1	9.00
Fort Vermilion.....	54.78	83.9	33.0	2.77	1.45	249.0	8.03
<i>September.</i>							
Ottawa.....	53.96	80.4	29.8	5.62	2.31	149.6	4.98
Fort Vermilion.....	46.57	79.0	14.0	0.02	0.02	285.6	9.52
<i>October.</i>							
Ottawa.....	47.13	68.0	27.0	5.17	1.35	134.1	4.32
Fort Vermilion.....	27.34	66.0	-15.5	1.55	1.00	136.0	4.38
<i>November.</i>							
Ottawa.....	34.97	52.0	11.2	2.52	0.89	80.5	2.68
Fort Vermilion.....	6.52	45.5	-23.5	0.75	0.40	66.7	2.22
<i>December.</i>							
Ottawa.....	19.67	42.6	-4.8	5.34	0.60	90.9	2.93
Fort Vermilion.....	-3.38	37.0	40.0	0.12	0.10	42.6	1.37
<i>January.</i>							
Ottawa.....	16.97	37.2	-22.0	2.53	0.55	86.7	2.79
Fort Vermilion.....	-1.02	47.9	-38.0	0.15	0.05	55.2	1.81
<i>February.</i>							
Ottawa.....	17.60	36.0	-8.8	1.59	0.65	158.4	4.94
Fort Vermilion.....	-10.96	26.5	-64.5	0.22	0.20	119.1	4.25
<i>March.</i>							
Ottawa.....	25.75	47.0	-7.8	4.53	1.50	148.3	4.78
Fort Vermilion.....	-6.29	46.5	-48.9	0.09	0.05	194.0	6.25

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RECORD of Sunshine at Fort Vermilion, Peace River District, Alberta, from April 1, 1918, to March 31, 1919.

Months.	Number of days with sunshine.	Number of days without sunshine.	Total hours sunshine.	Average sunshine per day.
April	28	2	256.0	7.86
May	28	3	226.3	7.30
June	29	1	263.8	8.78
July	30	1	320.0	10.32
August	29	2	249.0	8.03
September	30	0	285.6	9.52
October	21	10	136.0	4.38
November	20	10	66.7	2.22
December.....	15	16	42.6	1.37
January.....	15	16	56.2	1.81
February.....	22	6	119.1	4.25
March.....	30	1	194.0	6.25

EXPERIMENTS AT GROUARD, ALTA.

Owing to the coldness of the weather extending into late spring, seeding operations could not be commenced until the first of May. The crops continued to develop rapidly and had made excellent growth when they were injured by the severe frost on the 23rd and 24th of July. This seriously affected the grain crops which were late in being sown, and while the remainder of the crops were not abundant in their yields, yet the results were passable.

Three varieties of spring wheat, Prelude, Marquis and Huron, up to the July frost, had attained a height of 48 inches, 45½ inches and 52 inches respectively; Victory oats attained a height of 41 inches, Banner, 37 inches and Daubeney, 48 inches; Manchurian barley, a height of 51 inches and Success, 48 inches; Fall rye, a height of 72 inches when it, too, was set back by the frost.

As with the grain crops, the vegetables, at the time of the July frost, had an excellent appearance, exceeding anything in previous years, the seeds having been sown in hot beds the first of April. Cabbage, celery, tomatoes, cucumbers, squash, melons, beans, beets, carrots, corn, onions, peas, parsley, parsnip, radishes, turnips and lettuce, although very seriously injured by the frost, and subjected to the ravages of the white grub, gave fair results. Forage plants such as brome-grass, red top, timothy, alfalfa, red clover and alsike do not seem to give satisfaction, very few plants surviving and possibly nearly all will have disappeared by next spring.

EXPERIMENTS AT BEAVERLODGE, ALTA.

The season of 1918 proved a very unusual one. A late spring followed by a very cold, dry, frosty May, general throughout the West in 1918, was most unfavourable for the starting of garden seeds. The weather, however, was extraordinarily favourable for grasses and clovers, being, for the most part, warm with frequent showers from the 1st of June to late summer. The mid-summer frost, occurring on July 22 and 23, when most of the grain was heading out, was most disastrous to the finest grain-crop prospect in the history of Grande Prairie.

Three varieties of wheat were again tested, with the new wheat, Ruby, for initial trial. Of these, Huron again headed the list at 40 bushels per acre outyielding Marquis at 28 bushels, 41 pounds and followed by Ruby at 23 bushels, 30 pounds and Prelude at 12 bushels, 8 pounds per acre. Of the five varieties of oats tested, three of them having been compared for three years, Ligowo yielded 122 bushels, 15 pounds, Victory 101 bushels, 3 pounds, Daubeney, 101 bushels, Abundance, 111 bushels, 24 pounds,

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and Liberty O., 79 bushels, 14 pounds per acre. Three varieties of barley, compared also for the third season, gave O.A.C. No. 21, 7 bushels, 9 pounds, Early Chevalier, 19 bushels, 20 pounds, and Manchurian, 2 bushels, 9 pounds. Two varieties of rye yielded from 57 bushels, 32 pounds to 39 bushels, 36 pounds. Flax was tried for the first time, the variety Premost yielding 16 bushels, 4 pounds per acre.

Work with forage crops in 1918 comprehended a fairly extensive seeding with grasses and legumes, besides specimen plots in duplicate of field roots and several kinds of annual crops such as millet and rape. Experiments were carried on with grasses and leguminous haycrops regarding best varieties, economic seeding, thickness of growing and method of culture. In 1916 duplicate grass and clover plots were sown, the total yielded per acre of cured hay from the two years' crops being as follows: Western Rye grass, 5 tons, 1,558 pounds, Timothy, 3 tons, 325 pounds, Meadow Fescue, 3 tons, 91 pounds, Red Alfalfa, 2 tons, 1,389 pounds, Alsike, 2 tons, 1,243 pounds, and Red Clover, 2 tons, 220 pounds. In field roots, the Improved Short White carrots yielded 11 tons, 1,338 pounds per acre, Klein Wanzleben sugar beets, 10 tons, 40 pounds, Yellow Intermediate mangels, 13 tons, 360 pounds, and Canadian Gem turnips, 21 tons, 540 pounds.

In horticulture, the cold, dry spring somewhat retarded the germination of many of the less hardy vegetables. From the end of May, however, the weather was so favourable as to permit the early seedings to advance and they developed rapidly and, save for the areas devastated by the July frost, the garden presented a very attractive appearance. The season taught a very important lesson regarding methods of preventing injury by frost. Seven varieties of potatoes were tested, the yields varying from Early Northern at 231 bushels, 4 pounds per acre, and Early Rose at 217 bushels, 13 pounds to Irish Cobbler at 127 bushels, 26 pounds and Wee McGregor at 121 bushels, 30 pounds. A fairly accurate, comparative experiment was conducted regarding the time of planting potatoes, showing that those planted the earliest, April 27, yielded 412 bushels, 54 pounds per acre, compared with May 17, 203 bushels, 43 pounds, and June 7, 173 bushels, 53 pounds. The garden peas, beans, asparagus, beets, cabbage, celery, etc., gave creditable results, but the corn, cucumbers and melons were frozen in July.

The smaller fruits, apple trees and ornamental shrubs made a good showing considering the unusual season.

TABLE of Meteorological Observations taken at Beaverlodge, Grande Prairie, Alberta, from April 1, 1918, to March 31, 1919, giving the maximum, minimum, and mean temperature for each month, also rainfall, snowfall, and total precipitation.

Months.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total precipitation.	Number of days precipitation.	Heaviest in 24 hours.	Date.
April	49.60	26.46	23.13	38.02	65.0	30	3.0	2	0.20	4.00	0.60	1	0.60	24
May	58.06	33.09	24.96	45.57	76.0	28	22.0	16	0.19	0.03	0.22	3	0.19	31
June	65.00	42.66	22.33	53.82	78.0	21	30.0	5	1.70		1.70	11	0.62	14
July..	69.04	46.24	22.80	57.64	89.0	17	29.0	23	2.66		2.66	14	0.64	20
August	67.51	46.35	21.16	56.93	75.0	16	35.0	27	1.71		1.71	8	0.84	31
September	66.83	39.55	27.28	53.19	78.0	5 & 18	25.0	30	0.42		0.42	3	0.33	22
October	47.48	27.32	20.16	37.40	66.0	3	10.0	23 & 26	0.80	1.75	0.97	8	0.25	20
November	34.60	18.73	15.86	26.66	54.0	6	-1.0	22		5.50	0.55	3	0.30	28
December.	27.54	10.58	16.96	19.06	43.0	1	-17.0	30		11.00	1.10	4	0.60	28
January.....	29.93	14.29	15.64	22.11	46.0	8 & 9	-14.0	18		6.50	0.65	4	0.30	17
February....	16.42	-1.10	17.53	7.66	38.0	19	-31.0	25		7.00	0.70	5	0.20	21
March.....	20.16	0.32	19.83	10.23	47.0	31	-34.0	1		19.50	1.95	7	1.00	17
Total.									7.68	55.28	13.23	71		

*Melted snow.

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EXPERIMENTS AT FORTS SMITH, RESOLUTION AND PROVIDENCE,
NORTHWEST TERRITORIES.

FORT SMITH.

After a very severe winter, during which there was an unusual amount of snow, it was not until nearly the end of May that seeding operations were begun. Fortunately there were in hot beds vigorous young plants of cabbage, onions, radish and lettuce, so that as soon as the ground was sufficiently warm, all seeds were sown. In less than three weeks germination was complete, the seeds sprouting satisfactorily. The summer being somewhat cold, the plants suffered considerably and were stunted in their growth.

Copenhagan Market cabbages attained a weight of from 4 to 6 pounds while Kildonan ranged from 6 to 10 pounds. Of the four varieties of onions planted, viz., Yellowglobe, Wethersfield Red, Prizetaker and White Barletta, the Prizetaker, though being later than the rest, far exceeded in size. Two varieties of red carrots, the Chantenay and the Gueranda sowed the previous autumn, gave better results than the two varieties of white, the Blanche des Vosges and the Collets Verts sowed in the spring, exceeding the latter varieties by a difference of one-half pound in the weight of the carrot. Two varieties of beets were tested, the Eclipse giving almost equal results to the Detroit Red. The root crops, without exception, were seriously attacked by worms, an efficient remedy for which it was almost impossible to obtain. Similar results to the above were obtained from the various tests on the St. Bruno farm, 20 miles from Fort Smith.

FORT RESOLUTION.

Although there was a considerable amount of work done in connection with improving the land and with soil drainage, yet the season was one of the most unfavourable for the growth of crops. A late spring followed by unusual cold in the months of June and July seriously retarded development. About the middle of July a heavy frost almost completely destroyed the potato crop, which, along with the fact that the cabbages, beets and root crops were attacked by worms, resulted in a poor showing. Owing to the cereals not having ripened last year, there was a noticeable shortage of seed, the soil of the plots also being quite inferior. Considerable work was done in the culture of hot beds, which, notwithstanding the unfavourable season, the cold and drought, the worms and insects, gave excellent satisfaction this year. The hay crop was short and light and is not comparable with that of previous seasons.

Two varieties of barley, one from the Central Farm and the other from Fort Providence, did not attain to the same results as in previous years. Potatoes, having been injured by the frost, produced a poor crop, 80 bags yielding only 180 bags. Peas, of which eight varieties were tested, were also cut down by the frost. Turnips, considering the weather conditions, gave fair yields, the average weighing from 4 to 5 pounds, and some reaching even 7 pounds. Beets and carrots, coming up too late to develop sufficiently, gave only inferior returns.

FORT PROVIDENCE.

The spring of 1918 was late and cold weather continued on into early summer. As a result, the principal crop grown in the district—potatoes—was very light and the tubers poorly developed. Vegetables such as carrots, turnips, beets, cabbage, and cauliflower succeeded very well, as did barley, wheat, oats and peas. Considerable damage from insect pests occurred during the season.

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EXPERIMENTS AT SALMON ARM, B.C.

The spring opened with cool weather and light showers in April and the first half of May, enabling the potatoes and grains to make rapid growth. Dry weather with warm winds from the middle of May till July caused wheat and oats to ripen too rapidly, lowering the yield.

Considerable damage was caused by cut-worms which attacked the early-sown roots, just as soon as the plants appeared above the ground, thus making the root crop unusually light. The hay was light, while the drying winds killed the young, tender plants of the clover. The dry season was an advantage, however, in that the fruits were free from scab and fungus diseases and a very satisfactory price was realized from the apples, most of which graded No. 1. An interesting experiment was conducted with regards to comparison of different varieties of root seed, the plants of which, in some cases, went largely to seed instead of developing properly.

METEOROLOGICAL record at Salmon Arm for the year ending March 31, 1919.

	Highest Tem- perature.	Date.	Lowest Tem- perature.	Date.	Rainfall.	Snowfall.	Sun-shine.
					Inches.	Inches.	Hrs. Min.
1918							
April .	77	30	21	3	0.35		248 24
May..	79	12-14	31	26	0.62		223 54
June.....	88	12	34	3	1.46		287 30
July.....	99	17	44	3-25	0.79		272 42
August ..	93	24	42	28	2.81		222 42
September .	81	12	40	25	0.21		282 18
October ..	69	5-6-21	31	25-30	2.56		98 24
November.....	52	2	15	24	1.42	61	50 36
December ..	44	4	4	31	0.20	16	36 42
1919.							
January .	44	23	9	1	1.17	11 1	28 12
February.....	41	17	4	24	0.25	20 1	52 40
March.	64	28	-4	1	0.06	17	122 6
Totals					11.90	71 1	1,926 00

EXPERIMENTS AT SWEDE CREEK, DAWSON CITY, Y.T.

Several varieties of alfalfa were tested to ascertain which was most suitable to withstand the severe winters of this territory. All varieties, however, gave a fairly average yield. The plots of red clover and alsike also had good growth and fairly good yields. Timothy and a small percentage of alsike yielded at the rate of $2\frac{1}{2}$ tons per acre.

Of the wheat sown, Huron yielded $45\frac{2}{3}$ bushels per acre, Prelude, $21\frac{1}{3}$ bushels, and Marquis, 38 bushels. Banner oats yielded $77\frac{2}{3}$ bushels per acre, Victory, $54\frac{2}{3}$, and Daubeney, $37\frac{2}{3}$ bushels. Manchurian barley gave $28\frac{1}{3}$ bushels per acre.

In the root crops, several varieties of mangels, carrots and turnips were tested with a view to ascertain the effect of fertilizer. There was no noticeable difference in mangels and carrots, but the turnips, where the fertilizer was used, were superior in quality and quantity.

The garden vegetables did extremely well with the exception of carrots, beets, parsnips and onions which were planted on higher ground and did not receive so much moisture. Operations with fertilizers were conducted, in an effort towards soil improvement.

DIVISION OF ANIMAL HUSBANDRY.

REPORT OF THE DOMINION ANIMAL HUSBANDMAN.
E. S. ARCHIBALD, B.A., B.S.A.

The live stock work during the past year at the Central Experimental Farm has made rapid progress. Conditions as to housing and general management of the stock were excellent. The abundant supply of ensilage, green feed and hay, and the excellent quality of pasture during the summer, maintained the production of the stock and the growth of young stock in spite of the great scarcity, high prices and low grades of grains and meals. The scarcity of sufficient areas of pasture continued to be a handicap to greatest progress in either breeding or experimental work.

There are now 690 head of live stock in the stables, made up as follows:—195 dairy cattle, 32 horses, 184 sheep and 279 swine.

All the live stock made a good showing during the past year. Again every effort was made to assist in the movement for greater production of animals and animal products. Practical problems of an immediate nature were given precedence over other lines of experimental and demonstrational work. The more important of these are enumerated herewith.

All branches of the live stock work made a satisfactory financial showing during the past year in spite of many experiments in feeding, many of which proved to be inferior to good commercial methods. The sales of dairy products amounted to \$12,417.68, and the total sales of live stock \$21,963.01. The various herds and flocks have increased in value \$10,135. These, coupled with the value of horse labour supplied other Divisions, manure supplied other Divisions and feeds on hand, showed a gross turnover of \$62,500.89, of which the net profit was \$2,136.93. Considering the very moderate valuations placed on stock on hand, labour supplied, etc., and the high prices of feeds and labour purchased, and the large amount of experimental work done, this is a most creditable showing.

HORSES.

The horses on this Farm are mostly of the draught type, excepting the necessary drivers and express horses. With the exception of two tractors which are used experimentally, the horses do all the labour in power and transportation for all the divisions on this Farm. At present there are 32 horses, which include 25 draught horses and colts, 4 expressers and 3 drivers. The heavy draught horses include several excellent Clydesdale mares.

Breeding operations with the horses were not very successful during the year owing to the poor quality of stallions available for use in the previous season. However, there is excellent promise for progress during the coming year.

Experimental work along the lines of feeding was not continued during the year, but other experiments in rearing of young stock, the use of vaccines as a prevention of joint-ill, etc., were continued with satisfactory results.

The horses have increased in value during the year only to a slight extent, namely, \$240. That this was the hardest year on our horses may be seen in the increased amount of horse labour supplied. During the year the horse labour amounted to 8,188 days, which at the low value of 70 cents per day amounts to \$5,731.60. Had horse labour been valued at even as low a figure as \$1 per day this department would have shown a net profit of over \$1,700, whereas it just failed to meet all the extra heavy charges of feed, labour, shoeing, harness repairs, purchases, etc.

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BEEF CATTLE.

Due to limited facilities, no breeding beef cattle work is conducted on this Farm, and beef operations are, of necessity, limited to winter steer finishing.

During the past winter three carloads of steers were finished for market. These steers were purchased during the month of October and were put on excellent pasture after dehorning. However, the extremely wet weather of the following six weeks caused a heavy shrinkage in spite of the excellent feed available. The objects of this winter experiment were as follows:—

1. To discover the possible profits in finishing steers under present market conditions of feeds and finished beef animals.
2. To compare breeds of steers for winter finishing.
3. To compare finishing in cheap open-front sheds with steers finished in warm barns.
4. To compare medium grain feeding from the start with light grain finishing during the last ten weeks of feeding.

The weather of the past winter was particularly mild and when the yards were not too muddy these mild conditions were most favourable toward shed feeding. However, in spite of the handicap of muddy yards, all steers made excellent gains and a fair profit in spite of high initial cost, heavy shrinkage on fall pasture and high prices of feeds. During the feeding period of 134 days the steers showed a net profit of \$765 on the lot over and above all items of expense, including 6 per cent interest on investment.

General Conclusions from Experiment.

1. These conclusions are the result of only one year's experiment and must be taken as such, due allowance being made for individuals.
2. The late pastures of fall, if accompanied by heavy rainfall and raw, cloudy weather, will cause heavy shrinkage in steers, even though the grass is excellent.
3. Light grain finishing produces greatest profit per steer.
4. Feeding steers outside with a rough shed for sleeping shelter is very satisfactory, excepting when yards are soft in fall and spring, at which time gains will be slow and expensive.
5. Steers fed in the barn the same as in open sheds where special provision is not made for drainage and freedom from mud show marked advantage for inside feeding to the extent of 21 per cent greater daily gains, 18 per cent less cost per pound gain and considerably less feed per pound gain. However, the stable feeding is accompanied by more labour and a heavy overhead building charge, which more than offset the difference.
6. With better yards for shed feeding, there would be practically no difference in daily gains or cost per pound gain.
7. It pays to start the grain ration for winter finished steers very lightly and at a comparatively late date, thus increasing the grain at the time of warmer weather in late winter and early spring when greatest gains are thus made.
8. The lower standing of the Angus in the above experiment should not be taken as a criterion, as these animals were younger, finer, and many much nearer the finish than those of other breeds.
9. The Herefords were in the best condition throughout the experiment, were worth the most at all times, but being heavier-fleshed probably explains the lower gains than made by the Shorthorns.
10. The Shorthorns, good-framed steers but thinner than the Herefords, made greatest daily gains, greatest profits per steer, and at the least cost per pound gain.

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11. There is more difference between animals within the breeds of this experiment than between the breeds themselves. This is seen particularly in comparing the Angus of Lot I vs. Lot II, or of the Shorthorns and Herefords in Lot I vs. Lots II or III.

12. Finish steers during the winter for the Easter markets in order to make greatest profits. The following requirements:—

a. Steers in thrifty condition but thin rather than near the finish will make greatest gains and profits.

b. The quarters for wintering steers should not be governed by temperature as much as dry footing and freedom from mud.

c. Light grain feeding is most profitable and generally speaking, with good feeding steers, no grain is needed before January; grade increase of grain ration from 2 to 10 pounds, the maximum of 10 pounds would be held for about one month previous to marketing.

DAIRY CATTLE.

Four pure-bred and two grade herds are still maintained, namely: Ayrshire, 64 head; French Canadian, 20 head; Holstein, 49 head; Jerseys, 30 head; grade Ayrshire, 14 head; grade Holstein, 18 head. This total of 195 head of dairy cattle of all breeds and ages is an increase of 8 head over a year ago and is the greatest number of dairy cattle ever maintained on this Farm. The health of the herd has been excellent throughout the year and the production records have been equally satisfactory. A few unfortunate losses during the year, including the Holstein herd sire, due to accidents, and the high cost of replacing such animals, do not leave a net profit with this branch proportionate to other classes of stock. In addition to this the fact that butter was manufactured largely throughout the year caused a decrease in the revenue of at least \$3,000 as compared with the smaller amount of labour and the greater cash returns for milk if sold as such to the city trade at ruling prices.

Dairy Cattle Experiments.—The following lines of work have been inaugurated and maintained during the year:—

The completion of the series of experiments on green feed vs. ensilage as a pasture supplement showed results uniform with those of previous years. The ensilage is not only cheaper feed in itself but has an added advantage in the saving of labour. The difference in feed cost alone of producing 100 pounds of milk was over 20 cents per hundredweight.

A new feed now commonly found on Canadian markets, namely—Palm Nut Cake Meal—was experimented with and proved eminently satisfactory. The results of this trial were responsible for considerable quantities being introduced into Canada to alleviate the shortage of other feeds.

Several other materials thought of possible value for feeding of dairy cattle were tried, but none proved satisfactory owing to chemical or physical properties. Most notable amongst these was an attempt to use coffee bran as a cattle feed.

Careful data were again collected on the cost of rearing young stock of all breeds and sexes to various ages. These animals were fed on various farm roughages, and where grains or meals were required, the cheapest possible materials available were used.

During the winter a special study was made of several compounded dairy meals commonly found on our markets and which were being greatly advertised and sold during the period when meals were exceedingly scarce. This experiment has not been completed, consequently the definite results of the experiment cannot be given.

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The continued study of the various makes of milking machines has made satisfactory progress during the year. Two more new makes of milkers, notable amongst which is the McCartney milker, were installed.

The careful study of contagious abortion in cattle was continued. The work with serums and vaccines as a preventive was continued by the Health of Animals Branch, several types of vaccine being used. Although not definite in character the results are exceedingly promising.

Dairy Cattle Returns.—The following table shows production somewhat lower per cow than during previous years, which however, is accounted for by the high percentage of heifers which finished their lactation periods and are included in this report, and also owing to the fact that many of the best cows in the herd had not completed their lactation period during the year.

AVERAGES.

Number of Head.	Breed.	Age.	Average days in milk.	Average lbs. milk produced.	Average per cent fat in milk.	Average profit over cost of feed between calvings. Labour, manure and calf, etc., not included.
11	All breeds and ages.	5	312	7,755.8	3.89	86.11
5 Best.....	Ayrshire.....	7	314	8,075.7	3.66	81.91
10 Total herd.....	"	6	267	6,554.0	3.61	63.00
5 Best.....	Fr. Canadian.....	5	351	7,686.4	4.74	112.63
5 Total herd.....	"	5	351	7,686.4	4.74	112.63
5 Best.....	Holstein.....	5	350	14,255.2	3.38	146.5
18 Total herd.....	"	5	319	10,400.0	3.45	103.82
5 Best.....	Jerseys.....	5	367	7,708.2	5.26	120.4
15 Total herd.....	"	4	337	5,672.7	5.04	79.58
4 Best.....	Grade Ayrshire.....	7	311	6,988.1	3.64	75.0
4 Total herd.....	"	7	311	6,988.1	3.64	75.0
5 Best.....	Grade Holstein.....	7	300	8,779.8	3.53	88.95
9 Total herd.....	"	6	291	7,654.6	3.25	75.69

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Official Records.—In spite of the labour shortage and the great shortage of feeds, and especially high grade feeds, a few cows were again entered in official records, which, under very average commercial conditions, made the following very creditable records:—

RECORD of Merit Tests on Central Farm, April 1, 1918, to March 31, 1919.

Name and Number of Cow.	Age at Commencement of test			Number Days on Test.	Pounds Milk.	Pounds Fat.	Pounds 80% Butter.
	Years.	Months.	Days.				
Boutsje de Boer Posch 3rd 44452..... " "	2 2	4 4	17 17	7 30	323·5 1,290·5	10·30 41·86	12·89 52·33
Canaan Beauty 2nd 21172 " " " ..	6 6	3 3	14 14	7 30	641·0 2,698·4	18·84 74·86	23·55 93·57
Helena Keyes Posch 21376 " " " "	6 6	8 8	23 23	7 30	690·0 3,059·5	22·57 93·05	28·22 116·32
Jewel Belle Dewdrop 2nd 20244..... " "	7 7	10 10	9 9	7 14	448· 831·	15·73 30·25	19·66 37·82
Ottawa Woodcrest Lyn 44975.....	2	1	13	7	317·5	12·38	15·35
Ormsby Bessie Ann 43407. " " " ..	2 2	6 6	24 24	7 14	402·5 795·	13·75 26·25	17·19 33·32
Ottawa March Ormsby 36769 " " "	3 3	5 5	22 22	7 30	466· 1,857·5	17·41 70·01	21·77 87·52
Ottawa Pietertje Ormsby 44451..... " "	2 2	3 3	16 16	7 30	393· 1,647·5	15·19 61·83	19·00 77·30

CANADIAN RECORD of Performance, April 1, 1918, to March 31, 1919.

Name and Number of Cow.	Breed.	Age at Commence-ment of test.	No. Days Milking.	Pounds of Milk produced.	Pounds of Fat produced	Average per cent Fat.
Butter Boy Keyes 2nd Lass 19686.	Holstein	6 years	338	11,314	437	3.86
Canaan Beauty 2nd 21172	"	5 "	327	15,657	499	3.19
Evergreen March 3rd 12659.....	"	7 "	304	11,508	400	3.47
Lulu Ormsby 27288.....(App.)	"	4 "	358	10,937	409	3.73
Ottawa Bessie Anne 27130.	"	4 "	365	12,812	480	3.74
Balmangan Queen 2nd 48431.....	Ayrshire.	4 "	285	8,799	352	4.00
Gladys 2548.....(App.)	Fr. Canadian	5 "	347	7,999	421	5.26
Zaza Fille 3rd 2537.....(App.)	"	2 "	365	5,946	278	4.67
Br. Burma Lady 2537.....(App.)	Jersey.....	7 "	365	8,317	466	5.60
Br. Ruth D 7385.....	"	4	346	8,115	487	6.00

SLEEP.

Although the lack of pasture is still a great hindrance in the investigational work with sheep, yet the flock continues to improve very rapidly in quality, and is maintained reasonably well as to numbers. At the present time there are 184 head, representing the two breeds, Shropshire and Leicester. Allowing full value for labour, feeds, purchases, etc., the sheep on this Farm have produced a net profit of \$962.72 during the year.

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SWINE.

A successful year may be reported for this department of animal husbandry work. At the present time the herd consists of 279 head of all ages, being made up of 229 Yorkshires and 50 Berkshires. The comparatively small number of the latter breed is due to the fact that over 80 head of Yorkshire feeders were in the pens, and, further, that the Berkshire litters were purposely delayed for later farrowing. The total figures represent an increase of 63 head over the herd of April 1, 1918. Combining sales with valuation on manure at \$2 per ton, a profit of \$1,618.82 is shown. It will be remembered that besides the regular debit items of labour, feed and purchase, extra labour for experimental work is also accounted for.

During the past year, as for the previous years of the war, every effort has been directed toward increase of production. All experimental work has been of a nature designed to throw light on the commercial problems of the hog-feeder. At the present time the premises are crowded to capacity. During the year a large number of breeding pigs of all ages were disposed of. Herds were established or increased on several branch Farms from stock bred at Ottawa. Owing to the absolute need of increasing, improving and rebuilding the home herd each year, and of supplying branch Farms with breeding stock, it has been found necessary to curtail the sales of breeding sows to the public. This is to be regretted, and may be corrected only by facilities for increase in breeding operations.

Swine Experimental Work.—The summer experiments of 1918 were as follows:—

1. A study of the self-feeder-pasture method of hog feeding, using various pastures.
2. The value of pastures in the summer feeding of brood sows.

Summer Feeding Experiment No. 1.—Three pasture crops were made use of, rape, barley, and clover. With an acre of the latter crop, 29 hogs were fed for 119 days, consuming 11,145 pounds of grain from a free-choice feeder containing corn, shorts, screenings and tankage. The gains were made at a cost of 8.4 cents per pound, and the percentages of the different grains thus consumed on the "free choice" system are interesting: Corn, 62.2 per cent; shorts, 18.8 per cent; screenings, 11.4 per cent; tankage, 5.6 per cent. The same grain ration, self-fed, to 18 hogs on barley pasture, resulted in slightly decreased cost, .08 cent per pound. With 18 hogs on rape, gains were made at a cost of 8.7 cents per pound. The surprising feature of this individual test was the fact that six pigs self-fed in an indoor pen on a straight grain ration similar to that fed outdoors, made gains at 5.28 cents per pound, but were unfinished at the completion of the experiment.

Conclusions.

1. That the self feeder makes possible increased production, with a lessened expenditure of labour.
2. That clover pasture in an average season has greater carrying power than either rape or barley.
3. That rape pasture is not an economical or healthful feed for young pigs (the quality and growth of the rape-fed pigs was poor, a fact not indicated by the figures).
4. That no set rule should be followed with regard to the number of pigs to be carried per acre on any crop. During the first weeks of pasturing the growth must be kept down by increased numbers of pigs. These must be removed gradually as they grow. Once the plant attains any considerable advance toward maturity it not only becomes less palatable to the hog, but also ceases to make more growth.
5. That more evidence is necessary with regard to direct comparisons of the cost of limited, versus unlimited feed in pen, paddock and pasture, under the conditions applying at Ottawa.

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Summer Feeding Experiment No. 2.—Pasture for brood sows. Nineteen brood sows were pastured on 1 acre of rape for 69 days. Charging \$8 per acre for the rape pasture and allowing for a small amount of meal used when the sows were first put on the rape, the cost of maintenance per sow was 69 cents for the period, or 1 cent a day. During this period these sows lost, on the average, 19 pounds per sow.

Ten sows were meal fed on dry lot a mixture of bran and shorts, equal parts, for a period of 99 days, at a cost of \$9.97 per sow, or 10 cents per day. These sows gained on the average 57.6 pounds for the period.

From those of the rape-fed sows which farrowed, the following results were obtained: Average number of pigs per litter, 8.9; percentage dead or weak at birth, 13 per cent; percentage raised, 70 per cent.

The litters of the grain-fed sows showed as follows: Average pigs per litter, 12; percentage weak or dead at birth, 41 per cent; percentage raised, 45 per cent.

Conclusions.

1. While the cost to maintain the rape-fed pigs was very small and the numbers and quality of the resultant litters satisfactory, a number of the sows became too thin—one individual having to be removed. A very light grain ration fed once daily to sows on pasture, would but slightly increase the cost of maintenance, and ensure against undue loss of condition.

2. That the maintenance of brood sows by grain only is costly, would be clearly indicated. In this instance poorer quality of litters resulted.

Summer Feeding Experiment No. 2A.—Light meal feeding on pasture for brood sows. Fifteen of the rape-fed sows of the previous experiment were continued for one month on rape, with a light meal ration (2.3 pounds daily). These sows gained an average of 7.3 pounds per individual, and cost to maintain per head was \$2.91 for the period, or 9.7 cents per day.

Litters obtained from the foregoing lot would, of course, be largely influenced by the feeding previous to the month of rape-meal feeding. It would appear, however, that the "flushing" as induced by the light meal ration, was beneficial. The average size of the litters was 7, all strong pigs, 100 per cent of which were raised.

Winter Experiments, 1918-19.—Two experiments in winter fattening were conducted with two ages of pigs (*a*) middle and later summer litters (*b*) fall litters. The information sought in both cases mainly had reference to:—

1. Comparison of rations, with particular reference to the comparative utility of standard stock food.

2. Methods of feeding. Unlimited meal (self-fed) versus 3 per cent meal ration (trough fed).

3. Winter housing. Warm quarters, versus closed shed, versus open shed, versus open cabin.

The involved nature of these two winter experiments, and the large number of lots used, make comprehensive, brief recapitulation impossible. Concisely, the important deductions arrived at are as follows:—

1. *Comparison of rations.*—The average cost per pound gain by the following feed under different conditions and fed to different ages of pigs as follows:—

Standard stock food, 6.4 cents (average 5 lots).

Mixtures of standard stock food, corn, shorts, 9.9 cents (average 5 lots).

Schumacher feed, 9.1 cents (average 2 lots).

Ontario standard hog food, 11.1 cents (1 lot).

Monarch hog food, 10.5 cents (1 lot).

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Standard stock food was not only able, on the average, to produce the total gain equal to other lots, but, owing to its comparative cheapness on the market, the use of this feed lowered costs correspondingly. Only to illustrate this point are the above averages of value.

2. *Unlimited versus Limited Grain Feeding (Self-feeder vs. Trough).*

a. Fed indoors on the same ration,—

Self-fed hogs made gains at 7·6 cents per pound.

Trough-fed hogs made gains at 4·6 cents per pound.

(Note) see Health of Stock.

b. Fed in enclosed shed.

Self-fed hogs made gains at 6·3 cents.

Trough-fed hogs made gains at 11 cents (average).

The average cost to produce gains with the self feeder under all conditions was 9·2 per pound. With trough feeding, a similar average showed 8·8 cents as the cost of one pound of gain. Considering that the latter average was obtained from eleven lots, six of which contained the younger pigs as against four self-fed lots, and further, that the saving of labour was not considered with the latter, the advantage, if anything, rests with the self-feeding method.

3. *Winter Housing.*

a. Hogs from summer litters finished indoors showed an average cost of 11·2 cents per pound gain.

Fed in a closed shed, 11 cents.

Fed in an open shed, 11·1 cents.

Fed in an open cabin, 9·9 cents.

b. Hogs from fall litters fed indoors showed an average cost per pound gain of 6·8 cents. (See Health of Stock).

Fed in closed shed, 6·3 cents.

Fed in open shed, 8·2 cents.

c. The Health of Stock. It is frequently impossible to indicate by figures this factor, the most important, probably, of any entering into the feeding of swine. Frequently, low-cost gains do not mean high-quality finish. In the experiments just referred to, crippling, one of the most common ailments with which the swine feeder has to contend, seriously affected the younger hogs fed in the main piggery. Reviewing all lots, fed under all conditions, the following would appear:—

Fed indoors, 20 per cent crippled; 6 per cent total loss.

Closed shed, 6 per cent slightly crippled; 2 per cent total loss.

Open shed, one lot showed no crippling whatever; a second lot of younger pigs showed 20 per cent affected; no total losses.

Outdoor cabin—No crippling whatever, either during experiment or when finished for market.

Previous experiments, pointing to the possibility of economically winter-fattening hogs in cheap shelter, would appear to be amply borne out.

BRANCH FARMS.

The writer, in addition to his duties at the Central Experimental Farm, has officially visited at least once during the year all the Branch Farms and Stations where live-stock work is conducted or expected in the near future. Assistance was given in the establishing of several new herds and flocks, and the organizing and

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developing of live-stock work in every possible way. It is notable that in spite of severe handicaps in the shortage of buildings and often shortage of efficient labour, the live-stock work during the past five years has increased on an average nearly 50 per cent per annum on the Dominion Experimental Farm system.

BUILDING PLANS.

The Animal Husbandry Division has again during the fiscal year furnished plans and specifications of proposed new live-stock buildings for branch Farms. Several of these plans, approved by the Director of Experimental Farms, have been used by the Department of Public Works in the construction of these buildings.

A large number, over 500, of plans and specifications of farm buildings have been sent free of charge to farmers throughout Canada, and many excellent barns have been constructed after these plans to the marked satisfaction of their owners.

MISCELLANEOUS.

The correspondence and other office work of this division continue to make rapid growth.

The writer, as well as the staff of assistants, has spent a great deal of time attending a large number of meetings in various parts of Canada and assisting farmers to maintain and, where possible, increase animal production.

The duties of judging at numerous exhibitions, assisting at live-stock short courses, including the Ontario Judges' Course held on this farm, and the studying of live stock conditions and the needs for experimental and demonstrational work have received most careful attention.

DIVISION OF FIELD HUSBANDRY.

REPORT OF THE ASSISTANT DOMINION FIELD HUSBANDMAN, W. L. GRAHAM, B.S.A.

In the Field Husbandry Division the scheme of soil cultural and crop rotation investigation was continued during the year on the branch Experimental Farms and Stations. On the Central Farm no expansion of the work of previous years was possible since all suitable land is now taken up with most important crop rotation work.

As in the past, the cost of production of crops grown under field and rotation conditions is a feature that received considerable attention. The data available are of value in providing farmers and others of the several districts in which the matter is obtained with an outline or basis from which each may proceed to calculate costs according to individual requirements as to labour and other conditions.

WEATHER CONDITIONS AND CROP YIELDS.

Uniformly heavy yields were recorded in the season of 1918. Cool, dry weather in April facilitated seeding operations, all grain being sown by the end of the month. The preparation of land for hoed crops, including potatoes, mangels and Indian corn and the seeding and planting of these were finished by May 24. At this date, grain, meadows and pastures were very promising. June was cooler and wetter than usual and while grain and root crops did well, corn and hay were backward in growth. The first cut of hay was taken early in July averaging 2.25 tons, a second cut brought the average to 3.62 tons per acre for the season. Oats were harvested in August, averaging 77.3 bushels per acre, a somewhat better yield than usual. September was exceptionally wet and cool, making corn harvesting tedious. This crop was excellent,

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averaging 18 tons per acre. Potatoes were dug early in October and averaged 275 bushels per acre. The work of after-harvest cultivation and fall ploughing was hampered by continued wet weather in September, October and November, although on the farm all ploughing was practically completed. In the neighbourhood the condition of fall work was deplorable. Late grain was spoiled, the quality of ensilage corn was impaired as the work of harvesting was delayed and very little fall ploughing was done.

YIELD of Field Crops, Central Farm, 1918.

Crop.	Area.	Total Yield.				Average Yield per acre.			
		Acres.	Tons.	Lb.	Bush.	Lb.	Tons.	Lb.	Bush.
Corn	34	612	590				18	17	
Oats	40				3,094	14			77
Oat straw	40	60	1,525				1	1,038	
Hay	31	112	405				3	1,239	
Mangels	1	29							

COST OF PRODUCTION OF FIELD CROPS, CENTRAL FARM, 1918.

According to requirements, the data obtained on the cost of production of field crops are determined from fixed cost and return values. This is necessary in our work in order that the rotations and individual plot results within a rotation may be compared. This year the cost of production is lower than usual due to the uniformly heavy yields.

Cost of Production of Field Crops, 1918.

Crop.	Area.	Yield per acre.		Cost to produce.		
				per acre.	per ton.	per bush.
	acres.	tons.	bushels.	\$ cts	\$ cts.	cents.
Corn	34	18		28.37	1 57	
Oats	40		77 3	17 53		18 45
Oat straw	40	1.5		17 53	2 17	
Hay	31	3.62		21 40	5 91	
Mangels	1	29		42 26	1 49	

ROTATION OF CROPS.

To meet the several demands, fifteen rotations are under way at the Central Farm. The observations made, thus far, have led to the conclusion that for average conditions a suitable rotation must include hoed, grain and hay or pasture crops grown in the order named. It has also been found that the principles of crop rotations may be applied under various circumstances. Different combinations may be used, the duration of the rotation may be varied and if necessary two or more rotations may be practiced on the one farm. The main object to keep in mind in all cropping effort, is that the principles of a rotation must be observed if satisfactory crops and suitable soil conditions are to be maintained.

The rotations conducted under regular farm conditions on the Central Farm are herein outlined. The variations among the different rotations are such that one or more of them should be found applicable to average farms requiring varying amounts of different crops.

Rotation "A" (five years' duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay, top-dressed with manure in autumn; timothy hay, field ploughed in August, top-worked and ribbed up in October; grain, seeded down with red clover to be ploughed under the following spring, when the succeeding hoed crop is corn.

Rotation "B" (five years' duration).—Hoed crop, manured; grain, seeded down with clovers and grass, top-dressed with manure in autumn; clover hay, ploughed in autumn; grain, seeded down with clovers and grass; clover hay.

Rotation "C" (four years' duration).—Hoed crop, manured; grain seeded down with clovers and grass; clover hay, timothy hay, field ploughed in August, top-worked and ribbed up in October.

Rotation "D" (three years' duration).—Hoed crop, manured; grain, seeded down with clovers and grass; clover hay.

Soiling Crop Rotation "R" (three years' duration).—Corn for early fall feed, manured; peas and oats to cut green, seeded down with clovers and grass; clover hay to cut green.

The profits per acre for the past year are the second highest in seven years being higher in 1912 the year in which the re-arrangement in crop rotation work was made. The results for the past season were as follows.

Costs, returns and net profits from rotations "A," "B," "C," "D," and "R," 1918.

Rotation.	Cost to operate per acre.	Value of return per acre.	Profit per acre.
	\$ cts.	\$ cts.	\$ cts.
A (five years' duration).....	19 77	25 92	6 15
B (five years' duration).....	20 20	27 87	7 67
C (four years' duration).....	19 55	25 13	5 58
D (three years' duration).....	22 60	28 01	5 41
R (three years' duration).....	22 93	36 07	13 14

CULTURAL INVESTIGATIONS.

No addition to cultural investigation work has been found possible for several years, due, as has been on several previous occasions stated, to the lack of land. As in former years the following cultural investigations were continued on the Central Farm, Ottawa.

Shallow ploughing and subsoiling versus deep ploughing.—For this experiment two four-year rotations are used, differing only in the preparation of the sod areas for roots or corn as indicated in the foregoing heading. The results for the past season while in favour of deep ploughing are not conclusive and an average of the past several seasons work in this connection fail to show any decided advantage of one method over the other.

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SHALLOW PLOUGHING and Subsoiling versus Deep Ploughing.—Average for 7 years, 1912 to 1918, inclusive, of Cost of Operation. Value of crop and Profit per acre.

Year.	Rotation "S." Shallow ploughing and subsoiling.			Rotation "P." Deep Ploughing.		
	Cost of operation per acre.	Value of crop per acre.	Profit per acre.	Cost of operation per acre.	Value of crop per acre.	Profit per acre.
	cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.	\$ cts.
1912	19 47	27 14	7 67	19 02	28 99	9 97
1913.....	18 13	17 71	0 42	17 52	18 34	0 82
1914	17 96	20 33	2 37	17 36	21 12	3 76
1915	19 02	25 70	6 68	18 84	24 35	5 51
1916	18 83	22 76	3 93	18 86	21 55	2 69
1917.....	19 38	25 70	6 32	19 36	23 29	3 92
1918	20 10	25 88	5 78	20 14	2 84	7 70
Average of 7 years.....	18 99	23 60	4 62	18 73	23 64	4 91

Commercial fertilizers as a part substitute for barnyard manure.—In this experiment four four-year rotations are used. All receive similar treatment with the exception of method of application and quantities of manure and fertilizer. The plan of procedure is as follows:—

FERTILIZER Treatment given rotation "N," "X," "Y," and "Z."

Crop.	Rotation "N."	Rotation "X."	Rotation "Y."	Rotation "Z."
Mangels	No fertilizer	Manure, 15 tons	No. manure. Super-phosphate 300 lb., muriate of potash 75 lb., nitrate of soda 100 lb.	Manure 7½ tons. Super-phosphate 150 lb., muriate of potash 37½ lb., nitrate of soda 50 lb.
Oats.	No fertilizer	No fertilizer.....	Nitrate of soda 100 lb.	Nitrate of soda 100 lb.
Clover hay	No fertilizer	No fertilizer	Nitrate of soda 100 lb.	Nitrate of soda 100 lb.
Timothy hay.....	Pastured	No fertilizer	Nitrate of soda 100 lb.	Nitrate of soda 100 lb.

The results show the distinct advantage of barnyard manure alone over commercial fertilizer alone for this soil but point to the possibility of combining the two to good advantage when barnyard manure is scarce or high in price.

Rotation and cultural experiments on the branch Experimental Farms and Stations.—On the branch Farms and Stations crop rotation and soil cultural investigations have been under way for several years. On the eastern Farms, mixed farming rotations similar to those on the Central Farm, Ottawa, are in operation. In the prairie provinces both mixed farming and grain growing rotations are under way.

With a view to giving information as to methods of cultivation likely to prove satisfactory, a system of soil cultural experiments including methods of prairie breaking, preparing land for crops, moisture conservation, forage crop production, weed eradication and conservation and increase of soil fertility, is being followed in the different prairie provinces. In eastern Canada work of a similar nature has been started at Charlottetown, P.E.I., and will likely be extended to several of the other eastern Farms and Stations as soon as circumstances permit.

From the work to date, no definite conclusions can be drawn and it is probable that several years' data will be required before decisions can be made. The summary reports from the branch Farms contain more detailed observations on this work.

DIVISION OF HORTICULTURE.

REPORT OF THE DOMINION HORTICULTURIST, W. T. MACOUN.

The year 1918 will long be remembered by horticulturists in the provinces of Ontario and Quebec as one of the most disastrous to orchards that have ever been recorded in the history of Canada. The winter of 1917-18, while a very severe one, was but little, if any, severer than that of 1903-4, when much injury was done also, but the trees were late in starting into growth in 1917 and ripening of the wood was, on this account doubtless, not so thorough as in most seasons and there were very low temperatures in the early part of the winter. Many apple, plum and pear trees were killed and many more so weakened or badly injured that they will not recover. During the past sixty years there have been seven winters which have caused heavy losses among fruit trees in the provinces of Ontario and Quebec. These were the winters 1858-9, 1876-7, 1884-5, 1895-6, 1898-9, 1903-4, and 1917-18. Of these the winters of 1884-5, 1895-6 and 1898-9 were winters with little or no snow on the ground in the middle of winter, and root killing was the principal form of injury. During the past twenty years the two winters which have proved most destructive were those of 1903-4 and 1917-18, and in neither of these winters did trees suffer from root-killing in Eastern Ontario and the province of Quebec as there was a heavy covering of snow. There were 306 apple trees, including 164 varieties, killed in the orchards of the Experimental Farm, Ottawa, by the winter of 1903-4, and by the winter of 1917-18 there were 360 trees killed, including 200 varieties, and it is expected that still more will die which were badly injured. The temperature was below zero on 55 days in the winter of 1917-18 and for three months there was no real thaw. It was -25° F. as early as December 12, 1917, and the lowest temperature was -30.8° F. on December 30, 1917.

It is interesting to record that bearing trees suffered more than young trees not yet in bearing, and among the bearing trees those that had borne a good crop in 1917 were, as a rule, killed, when those which had borne little or no fruit in 1917 were practically uninjured. A row of trees in a Wealthy orchard at the Experimental Farm, planted in 1896, may be taken as an example. This was an outside row on the north side of the orchard. Tree 1 had died some years before, and tree 2 was in bad condition before winter, so they are not included.

Variety.	Row and Tree.		How affected by the winter of 1917-18.	Yield, 1917.
Wealthy	Row 8	trees 1 and 2...		
"	" 8	tree 3.....	No killing back	No crop
"	" 8	" 4.....	Killed	12 bushels
"	" 8	" 5.....	No killing back	3 "
"	" 8	" 6.....	Killed	21 "
"	" 8	" 7.....	No killing back.....	3 "
"	" 8	" 8...	Badly injured	15 "
"	" 8	" 9.....	Died in a previous year	
"	" 8	" 10.....	Badly injured	15 "
"	" 8	" 11.....	Badly injured	16 "
"	" 8	" 12.....	Killed	20 "
"	" 8	" 13.....	No killing back	10 "
"	" 8	" 14.....	Killed	19 "
"	" 8	" 15.....	No killing back	No crop
"	" 8	" 16.....	Killed.....	27 "
"	" 8	" 17.....	No killing back	No crop

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Thus, of 14 trees, the eight which bore a medium to good crop in 1917 were either killed or badly injured, while the six which had either a light crop or no crop at all came through in good condition.

In addition to the apple trees, practically all trees of European plums were killed, and even Russian varieties of pears which had withstood many winters were either killed or badly injured. Some trees of sour cherries were also killed.

FRUIT CROP.

In the autumn of 1917 there was promise of a very good crop of apples at Ottawa in 1918, as the foliage had been good during the growing season and the fruit buds were well developed but, owing to the very severe winter, the crop was a light one, as many trees which were not killed had their buds killed. Other trees also were weakened and the growth was poor, resulting in small, poorly-coloured fruit on the whole. Notwithstanding the very severe winter, the American plums or improved native varieties bore a good crop of fruit of excellent quality and offered another demonstration of the reliability of these plums in parts of Canada where the European or domestic plums are so uncertain. The crops of small fruits were medium to good, currants, gooseberries and raspberries not having suffered to any extent from the severe winter. During most of the cold weather they were well protected by snow. The crop of grapes was medium to good but, owing to the very cool autumn, few varieties ripened.

VEGETABLES.

During the war the interest in vegetable growing increased very much and reached its maximum in 1918. Every effort was made by the Horticultural Division to meet the demand for information by experimental work in the growing of vegetables and vegetable seed, by experiments and demonstrations in methods of canning, by the preparation and distribution of literature on vegetable growing and vegetable seed production, and by addresses and demonstrations.

Experiments with Vegetables.—While experiments were conducted with other vegetables, special attention was paid to the potato in 1918.

Potatoes—Importance of Source of Seed.—Since 1907 experiments have been conducted to compare the results obtained from seed of the same varieties of potato from different sources, and the results have been very marked. These results have been published from time to time in the annual reports and in bulletins, and it is known that many potato growers have obtained much larger yields than they otherwise would have done by following the recommendations to use seed from the best sources. Briefly stated, it has been found that potatoes grown in a relatively cool climate are much better for seed, as a rule, than those in a relatively warm climate. Hence, potatoes from the Maritime Provinces, from the cooler parts of Ontario and Quebec, from the Prairie Provinces, and from the cooler parts of British Columbia, are better, as a rule, for planting in parts of the province of Ontario where the summers are warm than those grown locally. There are not yet sufficient data to decide how much of this superiority is due to the greater freedom from certain diseases where the climate is cool and how much is due to the effect of the climate on the vitality or vigour of the seed. At Ottawa, as at many other places in Canada, certain physiological diseases are quite prevalent.

In 1918 the results at Ottawa were as marked as in other years, and show the importance of using good seed. Green Mountain potato from the Experimental Station, Fredericton, N.B., that had been grown there in 1917, yielded at the rate of 387 bushels 12 pounds per acre at Ottawa in 1918; grown at Fredericton in 1916 and at Ottawa in 1917, the yield in 1918 was only 193 bushels 36 pounds per acre; and grown two years at Ottawa only 96 bushels 48 pounds per acre; and from one lot only

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57 bushels 12 pounds per acre. Irish Cobbler potato from Fredericton grown there in 1917 yielded at Ottawa at the rate of 525 bushels 48 pounds per acre, while different lots from seed which had been grown in Fredericton in 1916 and at Ottawa in 1917 yielded in 1918, 129 bushels 48 pounds per acre in one case and 41 bushels 48 pounds per acre in another, and in one case where the potatoes had been grown on muck land at Ottawa in 1917 and dug on September 7, or about a month before the usual digging time, the yield was 250 bushels 48 pounds per acre. One lot which had been grown at Fredericton in 1915 and at Ottawa in 1916 and 1917 yielded only 26 bushels 24 pounds to the acre in 1918. The best yield of Irish Cobbler at Ottawa in 1918 was obtained from seed grown at Peterboro, Ont., in muck land, in 1917. This yielded at the rate of 616 bushels per acre.

Potatoes—Time to Plant.—As potatoes yield fairly well, even when planted rather late, if given good attention, it is the practice with many farmers in the province of Ontario to delay potato planting until the latter part of May when most of their other crops are in, but experiments at Ottawa for several years have shown that, if the largest yields are desired, it is well to plant early in May. The results obtained in 1918 are much like those obtained in other years, and are as follows:—

Planted.	Irish Cobbler, yield per acre.		Green Mountain, yield per acre.	
	bush.	lb.	bush.	lb.
May 11	421	12	470	48
" 27	363		402	36
June 10	330		321	12
" 24	94	36	70	24

From the results obtained at Ottawa and the branch Farms and Stations, the following general recommendations for planting potatoes throughout Canada may be made. Where the spring is early and autumn frosts early, plant early. Where the spring is early and summers are dry, plant early. Where the spring is late and autumn frosts do not come until late, early planting is not so important. Where the spring is late and autumn frosts are early, plant as soon as the soil is dry enough.

Vegetable Seed Production.—Experiments in the production of vegetable seeds were continued on a larger scale in 1918 at Ottawa and at the branch Farms and Stations than in previous years. It was not known how long the war would continue and whether the shortage in vegetable seeds would become more acute, hence it was desired to show what vegetables could be grown successfully for seed purposes in Canada and how they should be grown so that those who desired to grow seeds for their own use would have information that would enable them to do so.

At Ottawa good seed was grown of beans, beats, cauliflower, cabbage, carrots, celery, corn, cucumber, lettuce, melons, onions, parsley, parsnip, peas, peppers, pumpkins, radish, salsify, spinach, squash tomato and turnip or nearly all the principal vegetables. The plot on which these were grown varied in size from about one-fifth acre down. The results obtained in former years from home-grown seed showed that, on the whole, it was as good, or better than, imported seed. More information was obtained in 1918 on methods of wintering the more difficult kinds of vegetables intended for seed production.

Experiments for the Control of Cabbage Root Maggot.—The results of experiments in the control of the cabbage root maggot at the Central Experimental Farm in 1918 indicate that corrosive sublimate and oakum are two very promising remedies

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for the maggot. The corrosive sublimate was used at the rate of 1 ounce to 10 gallons of water and applied four times at intervals of a week beginning immediately after the plants were set out, about a teacupful of the poisonous preparation being poured around each plant. The method of using oakum was to press a small amount of the material around the base of the plant. The tar felt disc has in the past been found the best preventative, and gave a slightly larger number of heads in 1918, but the other methods are easier to follow. The results were as follows from sixty plants set out on May 25 for each method: Oakum, 52 marketable heads, weight 9½ pounds 8 ounces; tar-felt paper discs, 54 marketable heads, weight 105 pounds 4 ounces; corrosive sublimate, 47 marketable heads, weight 96 pounds 12 ounces; unprotected, 21 marketable heads, weight 29 pounds 2 ounces.

Vegetable Breeding.—There is such a vast area in Canada where the season of warm weather is relatively short that much attention has been paid in the Horticultural Division for some time to the breeding of varieties which will be ready for use early and will mature early. The breeding and selection of new sorts was continued in 1918, and some of the most promising are being multiplied. Special attention is being paid to corn, beans, tomatoes, melons, onions and peas, but other kinds of vegetables are being selected to, improve if possible, the variety.

CANNING FRUITS AND VEGETABLES.

Experiments and demonstrations in the canning of fruits and vegetables were continued in 1918. Great interest was shown in the work by the public, and many persons availed themselves of the privilege of coming to the Experimental Farm to learn the best methods. Demonstrations and exhibits of canned vegetables were again made at the Central Canada Fair, and numerous questions were asked by many persons among the thousands who visited the Experimental Farm exhibit. Experiments with different recipes made in 1917 were checked in 1918, and new ones tried. Experiments to determine the relative merits of different varieties of apples, plums, raspberries and strawberries when canned or preserved and, in the case of apples, when made into apple sauce, were continued and useful results obtained.

GREENHOUSES.

The greenhouses were kept fully occupied in 1918, crops of cucumbers, tomatoes, lettuce and melons being grown, while an experiment was tried in producing cauliflower seed under glass and, while the time required to mature the crop made it somewhat expensive to grow, a fair crop of seed was obtained.

Cucumbers were tested at different distances apart and a number of varieties compared. Davis Perfect, Rennie's XXX and Giant Pera were three of the most productive sorts.

As a result of the experiment with different varieties of head lettuce in 1917-18, it was decided again to test the four varieties which had succeeded best, these being the Sutton Golden Ball, Veitch Golden Queen, Early Paris and Earliest of All. The experiment was again very successful, there being an almost perfect stand of well-headed plants, and there seems no good reason why Canadian growers of lettuce should not grow these varieties where better prices can be obtained for head lettuce than for Grand Rapids. The Earliest of All showed some scalding on the leaves, but the other three were practically free, and from two years' test can be recommended with confidence if grown with care. The two first varieties cannot be distinguished from each other. The Early Paris is the most compact and is larger but not quite so attractive in appearance as the Golden Ball and Golden Queen. The Boston Market

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lettuce was later in heading than the others and scalded considerably. Different distances apart were tried and from the results obtained six inches apart is quite sufficient for Golden Ball and Early Paris.

Bonny Best has proved the most satisfactory tomato in the greenhouse so far.

Chrysanthemums, Cyclamens, Schizanthus and Geraniums were the principal flowers grown, the beds on the grounds being supplied with geraniums from the houses. Many fine new varieties have been originated at the Experimental Farm, Ottawa.

ORNAMENTAL GROUNDS.

The ornamental grounds were again much admired by visitors in 1918, and must be an inspiration to many Canadians to beautify their homes. Experiments were continued with many kinds and varieties of annuals, special attention having been paid to asters and sweet peas. The collections of pæonies, iris, phlox, roses and lilacs have now included in them a large number of the best sorts.

PUBLICATIONS.

Because of the great demand for information in regard to vegetables during the war and the importance of having information available for returned soldiers who might desire to go into horticulture a special effort was made to meet this demand by the publication of pamphlets and circulars, and the following were prepared by the Dominion Horticulturist and published during the year:—Vegetable Gardening at Home and on Vacant Lots (Circular 14); When Should Potatoes be Planted to Obtain Maximum Crops? (Special Circular No. 18); Importance of Planting Good Seed Potatoes for High Yields (Special Circular No. 19); Every Gardener His Own Seed Grower, Part 1 (Special Circular No. 12); Part 2 (Circular No. 17); Selection and Wintering of Biennial Vegetables for Seed (Circular No. 15); Digging and Storing of Potatoes (Pamphlet No. 15); How to Make and Use Hotbeds and Cold Frames (Pamphlet No. 19); Tomato Culture, Mushroom Culture, Forcing Rhubarb in Winter (Pamphlet No. 22); Cabbage Culture, Cauliflower Culture (Pamphlet No. 23); Asparagus Culture, Celery Culture, Onion Culture (Pamphlet No. 24); Melon Culture (Pamphlet No. 26). A bulletin on The Strawberry and Its Cultivation in Canada was also prepared and sent to press before the close of the year.

VISITS TO BRANCH FARMS AND STATIONS AND CORRESPONDENCE.

By his annual visits to the branch Farms and Stations, the Dominion Horticulturist is able to keep in touch with the work which is going on there by coming in personal contact with it and studying the local conditions of soil and climate and is thus more competent to assist the superintendents than if such visits were not made. Twenty of the principal Farms and Stations were visited in 1918. Weekly reports are received from the superintendents throughout the year, which keeps the Dominion Horticulturist in very close relations with the superintendents and their work and, in addition, there is much correspondence with them in regard to supplies and other matters of interest in horticulture.

The general correspondence of the Horticultural Division has been very heavy during the war as thousands of persons became interested in horticulture, particularly in vegetable culture, who had never done so before, and this correspondence reached its maximum in 1918, but was attended to promptly.

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POULTRY DIVISION.**REPORT OF THE DOMINION POULTRY HUSBANDMAN, F. C. ELFORD.****THE WORK OF THE DIVISION.**

The work of the division this year has progressed more satisfactorily than it has for the past few years, in that for most of the year better help was procurable. During the first of the year there was some changing of men but towards the close, and especially since the end of the year, men for the branch Farms have been more available and at the present time there is a better class of men in charge of the work than ever has been.

The young stock, though late last spring, matured fairly well, with the result that those entering the laying pens in the fall were well developed. The weather being mild, the yield during the winter was above the average and the prospects are for a good hatching season this spring.

NEW STATIONS.

A start was made at two new Stations this year, Lennoxville, Que., and Summerland, B.C.

The poultry buildings at Lennoxville were not completed and it was found impossible to put in the stock in the fall. A start with chicks will be made in the spring. A number of chicks were hatched at Summerland and one house of laying hens kept over the winter. Preparation is being made to make a start also at Rosthern during the coming spring.

EXPERIMENTAL WORK.

A very brief summary follows of experimental work conducted by the Division at the Central Farm and the branch Farms.

BREEDING WORK.

While a certain amount of attention is being paid to cross breeding, the main work is in the endeavour to produce heavy laying strains of the most suitable varieties.

After some years' work, it was found advisable on account of limited accommodation and other circumstances, to confine the work to fewer varieties than had been used in the past, so it was decided that Barred Plymouth Rocks, White Wyandottes and White Leghorns should be the breeds to be used.

Even with the reduction in the number of varieties, progress is not rapid as, in the three varieties, only as many pullets can be kept as should be kept for each one. However, according as the branch Farms become developed, they are taking up this work, so that more progress will be possible.

For the recording of the work, a number of forms are used, the most important of which is the "Egg and Breeding Records" on the reverse side of which are the "Pedigree and Photographic Records." This form contains a general summary of the information gathered from the sheets devoted to "Chick Records" "Male Mating Records" "Mating" "Hatching Records" and the "Monthly Egg Records."

To keep track of the chicks from the various matings the following methods are used: When the eggs are collected (trap-nests being used) the number of the pen and the number of the hen that laid the egg are marked on the end of each egg. When the eggs are set, a record of the number set from each hen is kept. On the eighteenth day the eggs are placed in pedigree baskets. These baskets are made in two sizes, one to

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hold three or four eggs and the other to hold eight or nine. Only the eggs of one hen of a breed are placed in a given basket so that when the chicks hatch, each individual hen's chicks are known.

When a chick is taken from a basket a band is wrapped loosely around its leg. At three weeks of age the band is removed from the leg—a slit is cut in the web of the wing back of the ligament—avoiding the veins—and the band is inserted and sealed. This band remains on the bird throughout life. When the pullets are put into winter quarters the "Mature band" is put on the leg. The number on the leg band is the number under which the bird goes through life, the wing band being the connecting link between the chick records and the "Egg records" so that in case the leg band is lost, the bird may still be identified by the wing band.

On the "Mature" bands year letters are used—this avoids the use of large numbers and indicates the age of the individual. Thus, if the records were started in 1917, the numbers for that year would be preceded by A, in 1918, the numbers would be preceded by B and so on. If a hen bears the band "A" it indicates that the hen was hatched in 1917, and is therefore, in 1919, in her third year. If "B" she was hatched in 1918, and is therefore in her second year, and so on.

Space will not permit of full details of the system of records, but those who are interested can obtain full information by writing this division.

THE BEST TIME TO HATCH.

The best time to hatch chicks for winter eggs has always been debatable, and in order to obtain data on this records were kept for the hatches for five spring months, February to June.

According to the percentages of fertility, the months are rated in order of high fertility as follows: February, May, March, June and April. In the percentages of total eggs hatched the order was May, June, February, April and March. The percentage of fertile eggs hatched placed the months in the following order: April, May, June, February and March. The total number of eggs required for one live vigorous chick on July first gave the following order: April, May, February and March. The June hatches were omitted from this.

These results indicate that the best month to hatch in order to get the greatest number of live healthy chicks was the month of April.

WINTER EGGS.

This experiment was carried on through the winter in order to see which chicks would give the best return in eggs during the winter months, and the results go to show that, for early winter eggs, the April hatched birds are also best.

It was not possible to have this part of the experiment carried out fully at all the plant, but the figures at those Stations where these figures could be collected show about the same variation that does the plant at Lethbridge, Alberta, from which branch farm the figures were most complete. These figures also show what 160 well-matured Barred Rock pullets can do if they are well looked after.

This lot of pullets was divided into three pens:—

No. 1	pen	55	Barred Rock pullets, hatched	March 29.
No. 2	"	55	"	April 21.
No. 3	"	50	"	May 18.

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Egg yield for three Barred Rock Pens of Pullets for five winter Months—Winter 1918-19 at Experimental Station, Lethbridge, Alta.

Month.	Pen No. 1 hatched March 29.	Pen No. 2 hatched April 21.	Pen No. 3 hatched May 18.	Total per month.	Average per month per bird.
November	873	782	231	1,886	11.7
December..	1,046	1,183	882	3,112	19.4
January.....	1,044	1,185	1,015	3,244	20.2
February	841	957	693	2,491	15.7
March.....	934	884	888	2,703	16.8
Totals	4,735	4,991	3,710	13,436	
Average per bird.....	86	90.7	74	84	10

FINANCIAL RETURNS.

Pen.	No. eggs.	Value.	Cost of feed.	Profit.	Profit per bird.
		\$ cts.	\$ cts.	\$ cts.	\$ cts.
No. 1	4,735	257.57	79.45	178.00	3.23
No. 2.....	4,991	271.04	70.70	199.99	3.51
No. 3	3,710	206.46	70.19	136.27	2.90

Though all birds made a good profit, much better than the average pullet hatched throughout Canada, there was considerable difference between the April and the May hatches, a difference of \$55 on the 100 birds.

HATCHING RESULTS OF BREEDS.

The four most popular breeds kept at the Experimental Farms, and which may be considered the popular breeds of Canada, Barred Rocks, White Wyandottes, White Leghorns and Rhode Island Reds showed the following average fertility and total eggs required for one chick hatched:—

Variety.	Per cent Fertility.	Total eggs required for 1 chick.
Barred Rocks	77.0	2.8
White Wyandottes.....	87.5	3.1
White Leghorns.....	88.0	2.1
Rhode Island Reds....	86.8	3.0
Average	74.6	2.9

HENS vs. Pullets for Fertility and Total number of Eggs required for 1 Chick Hatched.

Age.	Fertility.	Total Eggs Required for One Chick.
Hens.....	73.7	2.4
Pullets.....	79.8	2.9

The pullets when compared with the hens did much better than is generally supposed. These pullets, however, were strong vigorous birds and well matured. Late-hatched or poorly-developed pullets should not be considered as fit for breeding at any time.

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EGG LAYING CONTEST.

An egg laying contest was started in Prince Edward Island November first last on the Experimental Farm poultry plant at Charlottetown. This was staged because of the keen interest the farmers of the island are taking in commercial poultry and in compliance with a repeated request for a contest.

The added interest which the contest has occasioned is considerable and there is no doubt that it has demonstrated the practical value of laying contests as a means of placing emphasis on production.

Since this contest is the first that the Federal Department of Agriculture has conducted, the Rules and Regulations are given.

PRINCE EDWARD ISLAND FIRST ANNUAL EGG LAYING CONTEST.

To be held at the Experimental Farm, Charlottetown, commencing November first, nineteen eighteen, and continuing for eleven months until September 30, 1919.

Rules and Regulations.

This competition will be known as "The First Prince Edward Island Annual Egg Laying Contest." It will be conducted on the Experimental Farm at Charlottetown, and under the direction of the Poultry Division of the Experimental Farm.

Board of Management.—The board of management will be, The Dominion Poultry Husbandman; Superintendent Experimental Station; J. G. Morgan, Superintendent of Contest; and W. Ker of the Poultry Division, Live Stock Branch.

Scope and Number of Entries.—The contest will be open to all. It will consist of 20 pens of 8 females—hens or pullets. The first twenty bona fide applications received will be the twenty accepted. Contestants will be privileged to maintain throughout the year a full complement of eight birds. No males will be included.

Fees.—The entry fee for each pen will be One Dollar (\$1) which must accompany the application.

Prizes.—Suitable prizes will be awarded the winning pens.

Classes.—There will be two classes: Class 1, consisting of the Light Breeds; Class 2, consisting of the Heavy Breeds.

Delivering the Birds.—The birds must be delivered at Charlottetown, express prepaid, between the fifteenth and twentieth of October, nineteen eighteen. The shipment should be addressed "Laying Contest, Experimental Farm, Charlottetown," and must also have the name and address of the shipper plainly marked on the shipping crate.

Rejection of Birds.—Any birds arriving in a sick condition may, at the discretion of the Contest Superintendent, be rejected and either destroyed or shipped back to the owner. None but pure-bred birds will be accepted, and only those birds that lay a marketable sized egg. The Superintendent will have the right to clip the wings of any birds that may prove troublesome.

The Standard for Judging.—The rating of the birds or pens will be determined by the number, together with the size, the uniformity and marketing value of the eggs. The Canadian standards for eggs will be adhered to.

Feed and Care.—The birds while in the contest will receive the best of feed and care, but this will be subject to the judgment of the Board of Control. The eggs

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from all will be the property of the Government and will go towards the cost of feed, but each contestant will be entitled to the record of each bird he has in the contest and to a statement showing the receipts and expenditure of his pen for the eleven months.

Housing. The contest will be housed in double colony houses 10 x 12 feet divided into two pens having glass and cotton fronts. The houses will be placed on the poultry plant of the Experimental Farm facing the railway as it runs through the farm.

Reports. A summary of the standing of each pen in the contest will be compiled at the close of each month, a copy of which will be supplied the owner of each pen. The summary will also be provided the press of Canada and will thereby help to keep before the public Prince Edward Island as an egg producing centre.

Return of the Birds. If no notification as to the disposal of the birds has been received by September 1, 1919, the birds on the completion of the contest will be sent by express, collect, to owner's address from which the shipment was made.

Entry forms, will be supplied on application by addressing Superintendent, Experimental Station, Charlottetown, P.E.I.

NOTE.—No person except the officials of the contest will be allowed into the pens or yards after the birds have been housed. Every effort will be made to keep the birds quiet and no interference with them or their feed will be permitted.

FARM EGG AND POULTRY ACCOUNT.

The Division has continued to send out blanks of this form. A circular will be issued later giving data as to methods and results in more detail than is possible here.

TOBACCO DIVISION.

REPORT OF THE CHIEF OFFICER, F. CHARLAN.

From the point of view of tobacco growing, the season of 1918 was chiefly remarkable on account of the difference between the climatic conditions that affected the yield and quality of the crop in the province of Quebec and that in Southern Ontario.

Speaking generally, the early spring was very favourable to the plants in the seed beds and the transplanting into the fields both in Ontario and Quebec took place earlier than usual.

In Quebec, however, the summer was remarkably rainy and somewhat cool so that on a great number of plantations the tobacco crop could not reach a normal development, both on account of the flooding of the land and the coolness of the weather. In Ontario the temperature was higher but vegetation was greatly damaged by long periods of drought which were only broken by very light showers. The situation improved about the middle of September which permitted late plantations to give a crop almost normal in weight.

It might reasonably have been expected after the active demand for tobacco in 1917 that there would be a considerable increase in acreage devoted to this crop in 1918. This hope, however, was not completely realized for, in spite of the favourable spring, the production of plants in the seed beds was not sufficient. However, the 1918 harvest was a larger one than that of the preceding year. For Ontario it was estimated at about six million pounds of White Burley and about one million pounds of bright flue cured tobacco of the Virginia type. Exact figures for the Province of Quebec are not available. The area planted was at least 25 per cent greater than

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that in 1917. Unfortunately, in Quebec, in some cases, the crop was touched by the frosts of September. Probably the total production in the Province of Quebec was about five million pounds. The bright flue cured tobaccos of Ontario furnished, speaking generally, a product not so well developed as usual but of a good colour.

The development of the White Burleys depended to a great extent on the time at which they were harvested. The curing of the Ontario Burleys was effected under favourable conditions and the colour of these tobaccos was clearer than that obtained during the preceding year. The curing of the Quebec tobaccos was difficult on account of the excessive humidity of the autumn. The prices received for the Ontario tobacco in the year of 1918 were the highest ever known. The greater part of the White Burley was sold at prices varying from 30 to 35 cents per pound, while the flue-cured tobaccos of Virginia type were disposed of at from 40 to 60 cents per pound. The tobaccos of Quebec were sought for at the beginning of the season at a price reaching and sometimes exceeding 40 cents a pound. Only a small amount, however, was sold at this price before the period of stripping. The demand was less at the beginning of the winter but became greater again in January, when certain crops of tobacco suitable for binders were then sold at very high prices, exceeding fifty cents a pound.

EXPERIMENTAL STATION, HARROW, ONT.

The experimental work undertaken at the Harrow Station in 1918 tends to confirm, in a general way, the results obtained the previous year. In the disinfection of the seed beds good results may be obtained by sterilizing them with steam at 100 pounds pressure for thirty minutes. The seed beds covered with glass and the semi-hot beds proved themselves distinctly superior to all other types, even in the relatively mild climate of Southern Ontario.

Fall ploughing proved distinctly better than spring ploughing and it is also more economical, permitting of a better utilization of the animal and manual labour of the farm. It is also one of the best means of defence against insect pests.

As early transplanting as possible is to be recommended. This allows of harvesting the tobacco a little earlier in the autumn and thus assures a better curing. Moreover, the early planted fields seem to suffer much less from drought.

The use of arsenate of lead against the cut-worm proved very efficacious as it was also against the tobacco horn worm.

The mosaic disease did less damage than in preceding years. It was even noticed that a plot of the Warne tobacco, slightly attacked by mosaic at the beginning of the season, seemed to recover entirely before harvest. The best means of combatting mosaic would seem to be the prompt pulling up of the plants affected. Tobacco root rot (*Thielavia Basicola*) was frequently noted on the tobacco plants at the station and some plots were seriously affected. The greatest damage was noted to occur on clay soil. A close examination revealed the fact that those plants, on the roots of which a quantity of soil from the seed beds still adhered, were particularly subjected to attack. It would seem that in these conditions the putting forth of new roots in the soil of the plantation was considerably kept back.

The practice of splitting the tobacco stems at harvest time cannot be too strongly recommended in Canada. Some fifteen days are gained thereby in the curing period and a brighter coloured product is obtained. The test of varieties of flue cured tobacco showed that on rather strong land the Hickory Pryor furnished a tobacco of a brighter colour and more brilliant than did the Warne. Among the narrow leaved varieties the Flanagan furnished an excellent product of a good clear colour and firm texture and making an excellent type of pipe tobacco. A selection of Burley Resistant gave a higher yield in weight than that of Burley broad leaf. The latter had been planted a little late and consequently suffered more from the drought so that it is hardly fair to draw a conclusion as to its relative merits from this one test. As to colour, the Burley Resistant and the Burley Stand-Up gave a brighter product than

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did the Broad Leaf. The Burley Resistant should be cultivated exclusively on land affected by tobacco root rot but on clean land the Burley broad leaf and Burley Stand-Up should be preferred as usually these give a higher return.

The crop of tobacco seed produced at Harrow in 1918 was less than that of the preceding year in spite of the fact that a larger number of seed plants had been preserved. Pollination of these took place under unfavourable weather conditions so that the yield was considerably reduced.

EXPERIMENTAL STATION, FARNHAM, QUE.

In 1918 this station was devoted to the culture of Big Ohio x Sumatra, of Yamaska, of Brazil and of Mexican tobaccos. The two latter varieties are suitable for cigar wrappers and were studied from the point of view of acclimatizing them in Canada and at the same time so preserving the aroma so as to meet the needs of our cigar manufacturers. The Yamaska may be employed either as a cigar wrapper or a binder with an appreciable aroma. The Big Ohio x Sumatra was studied with a view to the production of a binder of fine texture and of a milder flavour than the Comstock Spanish and seems destined, in Canada, to take the place of the Connecticut Broad Leaf. The work in this connection would appear to have almost reached success.

The seed beds were very successful and showed no signs of disease. We were able to furnish plants to neighbouring planters as well as to make numerous replacements in our own plantations.

Transplanting took place earlier than usual, commencing May 27. The first area was planted under very favourable conditions but the weather changed suddenly, turning cold with strong winds which dried the plants out and covered the young plants up before they could establish themselves firmly. This made necessary a great deal of replanting under difficult conditions. The work was finished on June 17, although under normal conditions it should have been finished in the first five days of that month.

Growth at first was very slow. The temperature remained low during the whole season. The rains were very frequent and often very heavy. From May 27 to September 15 a rainfall of $27\frac{1}{2}$ inches was registered. Under such conditions all that could be done was to save part of the crop. The heavy frost of the night of September 9 almost completely destroyed the plants of Big Ohio x Sumatra. What remained of the crop, instead of furnishing tobacco suitable for cigar wrappers, only gave a little tobacco for pipe use. Curing took place readily enough for the tobacco harvested from August 27 to September 3 but was difficult for the crop brought in the last days of September, during the wet weather.

Insect damage was relatively small.

The untimely frost of the night of June 19 only caused small damage. It indicates, however, how the 1918 tobacco crop was subjected to adverse weather conditions.

Until August, the possibility of a crop seemed doubtful. However, from August 10 the tobacco plants developed rapidly. Unfortunately, however, the plants had been topped before that date, leaving only a limited number of leaves on each plant. However, under the influence of the constant rains, the tobacco plants developed without thickening of the leaves but they budded very vigorously which gave great difficulty and extra work in going through the plantations and removing the buds systematically.

The texture of the Farnham tobacco was, as was feared, deficient in quality both for use as wrappers and as binders.

Two selections of Big Ohio x Sumatra tested in 1918 are at present almost fixed from the point of view of shape and elasticity of leaf. The tip of the leaf is supple, a result which has never before been obtained to such a marked degree. A selection of

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Brazil St. Felix, in spite of the rigour of the season, did very well on the plantation and it is hoped that it may be possible to acclimatize it. It gave vigorous plants with leaves of an average size, sufficiently large for fillers and of suitable form.

EXPERIMENTAL STATION, ST. JACQUES L'ACHIGAN.

In 1918 this Station was devoted exclusively to the growing of filler tobaccos such as Cuban and Brazil.

For the first time since the station was established, the raising of seedlings was not a success and it was necessary to bring some seedlings from the Farnham Station. The tobacco plantation suffered from the same extreme temperatures as did that at Farnham. Ripening took place sufficiently early but the leaf had not reached its usual size. However, a fairly large percentage of fillers was secured of a type interesting enough from the point of view of aroma and which it is hoped to bring to the attention of manufacturers. The striking feature of the harvest at St. Jacques in 1918 was the considerable proportion of yellow and apparently withered leaves. When handling the crop in the warehouse, a large number of very thin leaves, on which the veins seemed to have almost disappeared, were noticed. Had the crop been larger these might have been experimented with as to their suitability for cigar wrappers.

Tobacco Diseases.

In a general way, in Ontario tobacco diseases were less common than in 1917 or 1916. However, in the seed beds a larger proportion than usual of plants were noticed attacked by "damping off." The cause seemed to be insufficient ventilation during the warm weather of spring and over wetting.

Selections.

Among the hybrids tried in Ottawa (first generation) a crop of Maryland gave very encouraging results. In spite of the damp season a fair proportion of lemon yellow leaves, slightly streaked with green, was secured, one of the types of Maryland most sought after on the European market.

The Espada x Cuban and the Espada x Vera Cruz promised to be suitable for the production of fillers, at least from the point of view of yield and probably from that of aroma, if it is possible to combine the characters of the Espada and Mexican or those of the Espada and the Cuban. The production in Canada of a filler of good aroma and giving a good yield is one of our most pressing problems.

Production of Tobacco Seed.

Results of a systematic trial of tobacco seed growing undertaken in 1918 at Harrow and at Ottawa seem to indicate that seed of the first quality may be obtained without allowing the capsules to mature entirely in the field. They may be gathered as soon as the upper half of the capsule is brown. They are then hung up in a place, clean and well aired, until they finish drying. The seed is threshed out in December. The harvesting of the seed capsules before they are entirely ripe permits one to avoid the sometimes serious losses when the capsules open either on the plant or when they are being collected.

Study of Tobacco Soils.

The work in this line made marked progress in certain districts of Ontario. The results obtained were used in the preparation of Experimental Farms Bulletin No. 38 on "The Growing of Flue-Cured Tobacco in Canada."

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Inspection Work.

This is more and more appreciated by the tobacco growers. The work has been still further developed in Ontario and the growers with whom our inspectors have come into touch seem more and more disposed to take advantage of the information furnished them and also to keep the inspector in touch with their needs and plans. In a general way, the majority of the growers seem to give their tobacco crop all the necessary attention both on the plantation and in the curing barn but, in topping, the work is often done much too late.

Co-operative experiments with fertilizers.

The inspectors of the Tobacco Division have secured the co-operation of a certain number of tobacco growers willing to make, under our direction, a thorough test of chemical fertilizers on their tobacco crop.

These planters realize the advantage resulting from the rational use of chemical fertilizers which, even with the high prices obtaining for fertilizers during the war, still showed a marked profit. The importance of the use of chemical fertilizers in tobacco growing is more and more recognized and those growers who have experimented with the fertilizers supplied them by the Department have decided to employ them on a still larger scale at their own expense.

Statistics.

In the course of his journeys through Ontario, the inspector has been able to collect the necessary data for the preparation of exact statistics as to the quality of tobaccos produced in 1918 in that province. Thanks to ever-closer co-operation with his correspondents, it is hoped soon to be able to give an estimate of the tobacco crop each year which will be almost exact, at least in so far as the plantations in Ontario are concerned. The growers are kept in touch with the condition of the crop by monthly bulletins sent out from the first of June.

CENTRAL EXPERIMENTAL FARM, OTTAWA.

As usual, the experimental field at the Central Farm was devoted to the production of tobacco seed and to the study of new varieties. The temperature kept so low during almost all the season that the seed harvest was considerably reduced and from a number of varieties no seed whatever could be obtained.

Transplanting took place in good time but growth remained very slow until the first of July. The crop was damaged by the hailstorm of June 30 which left very few leaves untouched. The Cuban and Mexican varieties succeeded very well but the Brazils had some difficulty in maintaining themselves owing to the unfavourable weather. The plantation made rapid progress from the beginning of August and developed to a marked extent during the latter half of that month. From that time, growth was extremely fast and had it not been for the hailstorm of June 20 one of the best tobacco crops ever gathered at Ottawa would have resulted, although probably the ripening would have been a little later. The selections already made preserve their characteristics and are even improving somewhat. A greater uniformity was noted in the selection of Comstock Spanish, of Yamaska and of Big Ohio x Sumatra.

Warehouse work.

Samples of filler tobacco cured in the course of the winter 1917-18 were sent to some Canadian manufacturers. It seems to be well established that the Canadian Zimmer Spanish has an assured future in this country. Among the tobaccos of the

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1918 crop, the best results as to aroma were obtained with the Cuban and the Brazils of St. Jacques. The aroma of the Mexican of Farnham is perhaps a little finer than that of the Brazils but it is difficult to express a decided opinion on tobaccos produced under such unfavourable conditions. The comparison between the filler tobacco fermented in bulk and fermented in the case by the method of forced fermentation, showed that fermentation in bulk is the better for the development of aroma.

Seed Distribution.

In the course of the winter, the Tobacco Division distributed a little more than 5,000 samples of tobacco seed. The requests from Quebec growers were mostly for Comstock Spanish. The number of requests for White Burley received from Ontario were much above those received in preceding years and all requests could not be filled. It seems that the demand for large Seed Leaf of Connecticut type has considerably fallen off in the province of Quebec as has also that for General Grant. This is explained by the high prices offered for Comstock Spanish of the 1918 harvest in which the ordinary pipe tobaccos have not participated.

DIVISION OF BEES.

REPORT OF THE APIARIST, F. W. L. SLADEN.

The rapid rise in the price of honey, begun in 1917, was continued in 1918, when a wholesale price of 22 cents to 25 cents per pound was reached and received for much of the white honey crop in Ontario and Quebec. In some parts of Ontario the production of honey per colony was above the average, but for Canada as a whole, the season was only fair. The long and severe winter of 1917-18 caused heavy winter losses where bees were not prepared for winter with the best of care. The winter losses were particularly heavy in the Annapolis Valley, N.S.

Bees were kept at sixteen of the Experimental Farms during the year. The following table gives the yield per colony of each apiary in 1918 with the annual average production since the year 1913.

Production of Bees at Experimental Farms.

	Average weight of honey produced per colony, spring count, in 1918.	Average Annual Production in past Six Years.		
		Period.	Weight of honey produced, spring count.	Value of net production of honey and bees.
	Lb.		Lb.	\$ cts.
Charlottetown, P.E.I.....	0.0	6 years 1913-18	19.3	0 87
Nappan, N.S.....	63.8	6 " 1913-18	95.8	12 88
Kentville, N.S.....	49.7	5 " 1914-18	47.4	8 11
Fredericton, N.B..	72.5	5 " 1914-18	50.9	9 91
Ste. Anne, Que.....		5 " 1913-17	60.0	10.39
Char. Riv., Que.....	48.0	6 " 1913-18	58.7	8 79
Lennoxville, Que.....		1 " 1918		6 00
Oshawa, Ont.....	123.5	6 years 1913-18	121.6	17 27
Brimley, Ont.....	51.6	6 " 1913-18	20.0	3.27
Mosely, Ont.....	0.0	2 " 1917-18	14.0	(loss) 0 05
Indian Head, Sask.....		3 " 1915-17	29.8	11 83
Lethbridge, Alta.....	86.5	5 " 1914-18	76.2	16 49
Edmonton, Alta.....	84.9	4 " 1915-18	52.6	12 79
Devonshire, B.C.....	118.9	5 " 1914-18	70.5	13 26
Strathcona, B.C.....	96.4	3 " 1916-18	61.8	11 81
Agassiz, B.C.....	38.2	5 " 1914-18	34.5	4 48
Surrey, B.C.....	62.4	5 " 1914-18	29.9	5 68

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In beekeeping, the climate of Canada presents, more definitely than that of the region to the south, two principal problems and an opportunity. The problems are the control of swarming and the reduction of loss of bees in winter, and the opportunity, hitherto scarcely recognized, is the very favourable conditions for raising bees in spring before the honey flow begins. At Ottawa the swarming instinct is so intense, and the time it dominates so long, that the most convenient way to prevent swarming has been found to be the radical one of removing the queen at the beginning of the honey flow from clover, followed, eight days later, by the removal of all queen cells except one from which a young queen is raised. The wintering problem has been found to be mainly a matter of raising plenty of young bees and providing them with wholesome stores, although, among careless beekeepers, the greatest losses in winter are due to insufficient protection or protection started too late, and insufficient stores. To better meet the two problems, and utilize the opportunity, a system involving the raising of two queens in each hive during the honey flow in July and keeping them there until the following May when one of them with her bees and brood is transferred to a separate hive, was planned and tried on a small scale at the Central Experimental Farm during the year. This system gives promise of an increased yield of honey with less labour.

Progress was made in our attempt to breed a non-swarming variety of bee. A number of queens were bred at the Central Experimental Farm from the only colony out of thirty-one in the apiary that made no preparations for swarming. Some of these queens were taken by the Apiarist in nuclei with drones of selected parentage to Kapuskasing, Ont., and Lake Edward, Que., to be mated, there being no probability that other drones were present in the neighbourhood of these places. Several matings were obtained, and much information which it is expected will facilitate such breeding work in the future was secured.

Beekeeping conditions in the northern part of Canada were studied concurrently with the mating experiments. This study has shown the advantages that would be obtained by protecting the hives better throughout the active season, and by having the bee-cellar for wintering better insulated and better drained, and has indicated certain advantages possessed by black or hybrid bees in parts of the north over Italians which have been found superior in the more southern parts of Canada.

At the Central Farm 6,185 pounds of honey were taken from thirty-three colonies, spring count.

Two colonies were placed near a recently burned-over area of bush containing raspberry and fireweed at Chelsea, Que., on May 22, and left there for the summer. 250 pounds of surplus honey were taken from one of these colonies and 228 pounds from the other.

Different kinds of winter stores for bees were tested at Ottawa in 1918-19, and special attention was paid to substitutes for syrup made from refined sugar on account of the serious shortage of this due to the war. Syrup made from raw sugar was found inferior to that from refined sugar, and a brand of cane syrup (golden syrup) killed in three months the only colony to which this was supplied. Dandelion honey was found to be unwholesome, but the white honey gathered in July, 1918, was found wholesome. The best results however, were, as usual, obtained from the regular stores supplemented with a liberal amount of syrup made from refined sugar.

Eight colonies on the latter stores that were wintered outside, packed in planer shavings in two cases taking four colonies each standing in our sheltered apiary, wintered somewhat better than four colonies on similar stores in the cellar. In one of the cases which had from five to six inches of side packing, the bees wintered no better than in the other which had only two and a half to three inches and the loss of weight of the outside wintered bees between October 11, 1918, and April 23, 1919, was slightly less (average loss 24 pounds) than that of the colonies wintered in the cellar (average loss 27½ pounds).

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DIVISION OF ECONOMIC FIBRE PRODUCTION.

REPORT OF THE FIBRE SPECIALIST, R. J. HUTCHINSON.

At the Central Experimental Farm, Ottawa, the work has progressed very satisfactorily during the past year. A number of varieties of flax-seed were tested as usual for the purpose of ascertaining their comparative value in the different flax areas in the Dominion.

Variety Tests.—During the year a total of 12 acres, including six varieties of seed, were tested at the Central Experimental Farm. The yields of the varieties were, on the whole, good, as is evidenced by their average yield per acre.

	Long Stem.	Ontario Dutch Child.	Imported Child.	Indian Head Long Stem.	Japanese Siberian.
Retted straw per acre.	2,980 lb.	2,990 lb.	2,954 lb.	2,502 lb.	2,894 lb.
Average yield flax fibre per acre.....	497 "	415 "	419 "	151 "	334 "
Scutched fibre per acre.....	1,085 "	1,521 "	1,655 "	1,500 "	1,170 "
Average value of scutched fibre per lb...	72c.	72c.	75c.	50c.	50c.

The flax grown in each plot was valued separately. The above figures represent the average of the valuations.

Small plots of Irish Riga Child, Canadian Common and Argentine seed were also grown. The two former produced fibre suitable for low grade fibre purposes, but comparative scutching tests were impracticable because of the small quantity of straw available. The crop produced from Canadian Common, a variety usually grown for seed, was similar in character to that from Minnesota 25, though coarse and not so uniform in length. The Argentine seed produced, as was expected, short-branched plants quite unsuitable for fibre purposes.

Flax Tests.—Over thirty-two acres of flax in plots were grown in different districts throughout Canada, the bulk of the crop being grown on the Experimental Farms system. Flax grown in the province of Quebec gave satisfactory results, although the fibre was rather short but the quality and spinning nature were excellent. Owing to the late arrival of the flax from the several other provinces, it was impossible to carry out retting operations during the present year.

Prairie Flax Straw Experiments.—Further experiments were made with prairie flax straw. About 1,000 pounds of fibre produced from the straw was shipped to Kitchener, Ontario, where commercial spinning experiments were made. Binder twine with soft, even surface, three-ply-spun, gave 750 feet to the pound with a breaking strain of 60 pounds and 50 pounds respectively. The breaking strain did not vary more than 1½ to 2 pounds either way. The experiments were so successful that the Saskatchewan Department of Agriculture urged further experiments on a factory basis. The Dominion Department accordingly provided the necessary financial assistance. A factory at Regina, Saskatchewan, was equipped with the necessary machinery to produce in commercial quantities a raw flax fibre. The fibre will be shipped east and further experiments will be made in the manufacture of coarse towelling, commercial twines and sackings. If the fibre proves as successful as we hope, this utilization of the western fibre will help to meet the fibre shortage.

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Retting Operations.—A considerable quantity of flax was again retted in concrete tanks. The operations were in progress from April till October, for commercial purposes. Experimental work was resumed later. Little alteration was made in the general lines of investigation, the experiments of 1917 being in many cases repeated. By the kindness of the Guelph Spinning Company, Ltd., and the Linen Thread Company, Ltd., the fibre from the retted experiments was tested in the hackling process and gave excellent results both for yield and high spinning qualities.

Commandeered Seed.—In view of war conditions the British authorities made a special request that all available Canadian seed (fibre variety) be commandeered for the purpose of securing an adequate supply of sowing seed for Ireland. By Order in Council dated October 23, 1918, all surplus flax-seed in Canada was commandeered, over and above such quantities as were needed to seed an area for each mill in 1919 equal to the area seeded in 1918. One hundred and ten thousand bushels were purchased, inspected, graded, sealed and stamped under the supervision of this division. The shipments were made direct to Ireland in lots of 400 sacks of 182 pounds each. The price realized was \$27.50 per sack f.o.b. cars.

Government Flax.—One hundred and seven acres of flax grown by the Ontario Department of Agriculture on the Willowdale farm, Toronto, was shipped to this division for threshing, retting and scutching. The crop had been damaged to a considerable extent by moulding. A great deal of work was required in grading the seed and straw. The crop has been threshed, the seed cleaned, graded and shipped to Ireland. That portion of the seed unsuitable for sowing will be returned to the Ontario Department of Agriculture.

Grading.—The system of fibre grading was started in several of the mills in southwestern Ontario. The grades are as follows:—

Dew Retted Qualities.—

- D. P. A. Superior Dew Retted Warp.
- D. P. B. Medium Dew Retted Warp.
- D. P. C. Medium Dew Retted Weft.

This system in so far as it was possible to operate it, worked very satisfactorily. The difficulties to contend with are many; the greatest obstacle being the so called scutchers who are not conversant with the desirable fibre qualities of flax. Hence it will require two or more seasons in which to school these men in making uniform and consistent grades.

Pulling Machines.—In view of the existence in Canada of a number of flax-pulling machines of different designs, and in various stages of development, it was desirable to make a thorough investigation into the suitability of these machines for Canadian conditions. In addition, other flax machinery and several processes merited careful inquiry.

With the approval of the Director of the Experimental Farms, two months were spent in various parts of the flax districts in Ireland. As a result of the investigation it is hoped to obtain a flax-pulling machine, a de-seeding machine and a scutching machine, all of which offer to give satisfaction.

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DIVISION OF CHEMISTRY.

REPORT OF THE DOMINION CHEMIST,
FRANK T. SHUTT, M.A., D.Sc. F.I.C.

Since the outbreak of the Great World War our energies have been more immediately and particularly directed towards assisting the man on the land with a view to a greater production of foodstuffs on the farm. This work has been carried on by correspondence, analysis, special circulars, press articles, etc., and there is satisfactory evidence that this educational and advisory campaign has been fruitful in its results.

This phase of our activities is by no means a new one. The "getting in touch" with the individual farmer and helping him with his daily problems has been an important feature in the work of the division since the establishment of the Experimental Farm system, for from the first we have held the view that, taking the country as a whole, there has been and will be for many years as great a need for the dissemination of the basic principles of agriculture as known to-day as there is for the advancement of our knowledge, thorough investigation and research. Agricultural chemistry furnishes not only the explanation of, but directs to a right and economic course in, a large number of farm operations—with soils, manures, fertilizers, crop growth, feeding of live stock, etc., etc.—and it would seem imperative for the best possible and most profitable results that the farmer should be furnished with that knowledge and assistance which this science alone can offer. And in this propaganda work we may feel certain that every farmer, every agricultural society so educated and enlightened, becomes a centre, consciously and unconsciously, for the spread of the knowledge and introduction of good practice. In peace days as well as in times of war, this "extension" work must be considered as well worth while, since we believe it serves not only immediately to increase production but also permanently to improve and render more profitable the occupation of farming.

The prosecution of investigatory and research work in connection with problems related to Canadian agriculture—a work which would naturally occupy a first place in the division's activities—has not been neglected. However, owing to the large amount of special work arising out of war conditions that has fallen to our share, it has not been possible to make the progress with the purely investigational work that marked pre-war times. As opportunity offers, and the work and the staff, with the establishment of peace, assume their normal condition, the investigations and experiments temporarily suspended, will again receive our attention.

SAMPLES RECEIVED FOR ANALYSIS.

In the subjoined table a classification is given of the samples received for analysis during the past fiscal year. The total, 9,568, exceeds that of the previous year by 5,729 and indicates the very large increase in the laboratory work that has been undertaken by the division. A very large proportion of this increase consists in the samples of flour, condensed milk and other articles submitted in connection with what may be regarded as special war work.

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SAMPLES received for Examination and Report during the twelve months ending March 31st, 1919.

Samples.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Is-land.	Total.
Soils	14	200	6		29	70	16	1	3	319
Muds, mucks and marls..	10		2		4	13	3	13		41
Manures and fertilizers.....	9	1	1		29	31	33	12	1	137
Forage plants, seeds and fodders.....	4	8	4	8	551	33	5	1	3	617
Waters, including rain and snow.....	3	16	29	4	78	13		4		152
Samples from Meat and Canned Goods Division.....										2,091
Miscellaneous, including dairy products, fungicides, insecticides, etc..	56	41	20	4	500	48	10	1	17	759
War Office samples (flour)										4,852
										9,718

EXAMINATION OF SOILS FOR FARMERS.

This phase of our work continues to grow in popularity. It consists rather in examination and diagnosis than in analysis, with the view of furnishing information of a suggestive and helpful character as to treatment with manures and fertilizers, the necessity or otherwise of drainage and liming, the presence of alkali, suitable crops, etc. Farmers desiring assistance of this character are supplied on application with a special "form" on which to enter particulars as to past cropping and manuring, etc., etc., information necessary to the satisfactory interpretation of the results of our examination.

INVESTIGATIONAL WORK WITH FERTILIZERS.

Experiment, Plan E.—This new scheme, embracing 60 variously treated plots, was introduced (in 1918) on the farms and stations of the Experimental Farm system, at Charlottetown, P.E.I., Kentville, N.S., Fredericton, N.B., Cap Rouge, Que., and Agassiz, B.C. Its primary object is to determine the most profitable combination and quantity of a fertilizer mixture, as measured by its influence, in relation to cost, throughout a three-year crop rotation consisting of, 1st year: hoed crop, 2nd year: grain, 3rd year: hay.

Complete Fertilizer Series.—While intimately correlated as a whole, the various sections of the scheme may be studied individually. In plot series 1 to 8 (24 plots) two quantities each of nitrate of soda, superphosphate and muriate of potash are applied in every possible combination, plot 1A receiving the three basic maximum and plot 8A the three basic minimum quantities. This method permits a comparative study of proportions, while the inclusion in each series of B and C plots—to which three-fourths and one-half, respectively, of the quantity of the corresponding A mixture are applied—permits a comparison of quantities.

In plot 1A the maximum quantities of nitrate of soda, superphosphate and muriate of potash combine to form a mixture equivalent to one ton per acre of either a 4:8:8 or a 3:10:5 fertilizer, the first formula being used for potatoes and the second for turnips as the first crop of the rotation.

While in each instance the fertilizers are expected to extend their influence throughout a three-year crop rotation, the fact is recognized that, as compared with

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turnips, potatoes are likely to draw more heavily upon the available supplies of nitrogen and potash and less heavily on that of the phosphoric acid; hence the reason for varying the initial formulæ.

The No Potash Series.—The inclusion of a complete series (11 to 15) without potash was considered desirable in view of the fact that potash is at present practically unprocurable and will not be plentiful for some time—perhaps years—to come.

Series 16 and 17.—At Kentville and Fredericton, in series 16 one-half, and, in series 17, the whole of the nitrogen is furnished in the form of sulphate of ammonia, while at Charlottetown, Cap Rouge, and Agassiz, series 16 and 17 are devoted to a similar test with basic slag as the partial or exclusive source of phosphoric acid.

Series 18 and 20.—In series 18 to 20 organic sources (abattoir by-products) of nitrogen and phosphoric acid are tested. In series 18 one-half, and, in series 19, the whole of the phosphoric acid—besides a proportion of the nitrogen—is furnished by tankage. In series 20 abattoir by-products—dried blood, tankage and bone meal—are employed exclusively to furnish both the nitrogen and phosphoric acid.

Manure and Fertilizers.—Since none of the areas involved had been manured for several years, all were treated, in the fall of 1917, to a uniformly light dressing of barnyard manure, at the rate of 10 tons per acre, fertilizer series 8, 9, 14, 15 received 15 tons and plots 21A and 21B (manure alone) 20 and 15 tons, respectively, per acre.

Check Plots.—These are situated at fairly regular intervals throughout the area, and among the number is a permanent check plot which will receive no fertilizer or manurial treatment whatsoever.

Results from the First Crop of the Rotation.—While any attempt to draw definite deductions from the results at this stage would be premature, certain inferences therefrom are warrantable.

The salient features revealed in a general study of the returns from comparable plots are: (1) the very striking lack of productiveness shown on the permanent check plot, which for more than five years has received neither manure nor fertilizers. (2) the uniformly low standing of the checks which received only the initial light dressing of manure and no fertilizer; (3) the beneficial influence of additional manure when used in conjunction with the fertilizers; (4) the distinctly lower yields produced from heavy applications of manure alone as compared with those from the practice of supplementing smaller quantities of manure with fertilizers; (5) the probability that, on certain soils treated to liberal amounts of nitrate of soda and superphosphate, potash in the fertilizer is less essential than where nitrate and phosphate are sparingly applied; (6) the superiority, in the first season, of nitrate of soda as the sole source of nitrogen as compared with sulphate of ammonia and certain organic sources of nitrogen constituting the whole or part of the nitrogenous component of the fertilizer, and (7) the evident greater influence, at this stage, of the more readily available forms of nitrogen and phosphate acid in comparison with those contained in organic substances.

Sources of Nitrogen.—In an experiment, conducted at the Central Experimental Farm, Ottawa, the relative values of nitrogen, furnished in nitrate of soda, nitrate of lime, sulphate of ammonia and dried blood, were studied in the potato crop. Dried blood failed to give any increase in yield over that of the plot which received no nitrogen in the fertilizer, whereas the other more soluble nitrogenous fertilizers produced from 30 to 50 bushels in excess of the yield from the no-nitrogen plot. At Agassiz, B.C., whale guano, as a source of nitrogen, was compared with nitrate of soda in fertilizer mixtures for mangels and corn. In neither instance did the whale guano increase the yield appreciably, whereas nitrate of soda brought increases of 12 to 20 per cent.

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These results must not be too strictly interpreted or deemed of general application: under different seasonal conditions the organic sources of nitrogen might have appeared to greater advantage. Of course, the nature of these organic fertilizers would lead one to expect their maximum influence to be deferred until the latter part of the season of growth, and, indeed, sometimes until the following year.

Sources of Phosphoric Acid.—In the greenhouse a pot experiment, now in progress, has for its object the determination of the relative values of phosphoric acid furnished in ground raw rock phosphate, superphosphate, three grades of basic slag, and "Tetraphosphate," the latter being the product of a newly patented Italian process. The pot test is intended as a preliminary check trial to precede experiments in the field at the Experimental Station, Cap Rouge, Que., and the Central Experimental Farm, Ottawa.

Sources of Potash.—Following an experiment, conducted last year, the results of which indicated that ground nepheline syenite may possess a distinct value as a potash fertilizer, another pot test with various new or unusual sources of potash is now under way, and is also intended as the forerunner of more extensive field experiments.

Experiment in Mangel-seed Production.—In co-operation with the Division of Forage Crops an experiment was conducted on areas devoted to the growth of "stecklings" and full-grown roots for seed production. The greatest yields of seed were obtained from plots which had received 200 pounds of nitrate of soda and 500 pounds of superphosphate per acre. A decrease of 19 per cent in yield followed the reduction of the nitrate of soda to 100 pounds per acre, nitrogen having proved to be the limiting fertilizer factor in the experiment. The omission of potash failed to depress the yield. Where no manure was applied, the yields from the check plots were only 40 per cent of those from the nitrate and superphosphate plots, while with manure the yields from the checks were 78 per cent of those from the fertilizer plots.

Influence of Manure on Irrigated Areas.—At Summerland, B.C., the results from two years' experiment agree in showing that applications of barnyard manure depressed the yields of both potatoes and oats. Mr. Helmer, the superintendent, suggests as a possible explanation of the phenomenon that the area was, perforce, inadequately irrigated and that, under these circumstances, the manure rapidly absorbed the water and withheld it from the crop. Plans have been made to test this theory thoroughly in an experiment where both the quantities of manure and of irrigation water will be varied.

Liming Experiments.—At Kentville, N.S. the application of ground limestone, alone and in conjunction with fertilizers and manure, continues to indicate very substantial profits from the practice, while, at Fredericton, N.B., neither burnt lime nor ground limestone has exerted any appreciably favourable influence, despite the fact that the soils on which they were used gave evidence of being deficient in lime.

At Cap Rouge, Que., three years' results from an experiment in which burnt lime and ground limestone are used in varying quantities with and without manure, indicate that, on the average, burnt lime has been about 12 per cent more effective than the ground limestone equivalent.

FERTILIZER MATERIALS.

These have included samples of limestone, marl, wood ashes, tobacco ashes, boiler and flue ashes, saline deposits and waters alleged to be rich in potash, muds and mucks, and a number of newly introduced fertilizers, e.g. "tetrafosfate," "slag and potash," etc.

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The limestones were submitted chiefly by provincial agricultural authorities, with the view of determining the value of the several deposits for the manufacture of ground limestone. This work has shown the necessity of analysis previous to working the deposit, if the loss involved by grinding low grade rock would be avoided.

LIMESTONES, 1918-1919.

Lab. No.	Locality.	Mineral Matter insoluble in acid.	Carbonate of lime.	Carbonate of magnesia.	Oxide of iron and alumina.
33826	Amqui, Que.	6.32	87.75	4.57	1.36
33827	"	24.00	58.50	12.80	3.92
33828	"	21.94	59.50	14.46	3.84
37036	Dorchester, N.B.	10.22	84.80	3.37	1.61
37037	"	32.00	57.19	10.37	0.44
37038	"	43.24	56.48	2.22	0.26
37555	Moncton, N.B.	20.32	3.43	5.75	4.80
37556	"	26.70	63.60	3.80	5.90
37557	"	48.00	38.45	4.85	8.70
38725	Lower Millstream, N.B.	0.70	1.64		0.22
38726	"	10.86	81.81	3.05	2.28
38727	"	5.32	81.34	0.94	2.40
39449	Chaparral, Que.	1.84	96.14	0.86	1.16
40113	Florenceville, N.B.	15.80	77.89	2.61	2.70
40114	Keswick, N.B.	32.74	60.15	5.41	1.70
40115	Hammondsville, N.B.	9.80	87.87	0.53	1.80
41763	Joggins Mines, N.S.	41.20	43.14	2.50	5.52
41764	"	36.16	47.57	2.12	6.04
41765	"	40.30	44.72	2.42	5.62
41766	"	43.28	41.91	2.50	5.90
41767	"	34.12	52.51	2.28	5.58
41373	Montreal, Que.	17.46	86.40		1.32

The value of ground limestone as an amendment for soils in need of lime—and of these there are many in Ontario and Eastern Canada—is becoming year by year more widely recognized.

Marl is found in many parts of Canada and analysis has shown that many of the deposits are of high quality. It is a form of lime eminently adapted to agricultural use, being soft and friable when air-dried and in this condition readily prepared for application to the land. Of the eight samples submitted to analysis, seven contained over 85 per cent carbonate of lime, as calculated on the air-dried material.

The potash content in the several samples of wood ashes examined varied from .76 to 8.25 per cent. These results clearly show the importance of purchasing this potash fertilizer on guaranteed analysis; no physical examination could satisfactorily determine the value of a sample.

Two samples of tobacco ash yielded 16.22 and 24.78 per cent of potash, respectively. This product, when free from extraneous and foreign material, is an extremely valuable fertilizer, though owing to variation in potash content it should always be purchased on guaranteed analysis.

Tannery ashes, chiefly from spent tan bark (hemlock), have given from .5 to 1.00 per cent potash and a sample of ashes from a sawmill using largely spruce refuse contained 5.02 per cent potash.

The boiler and flue ashes have shown from .5 per cent to .75 per cent potash.

A sample of "Fosforite" a native calcium phosphate, from Italy, and used in the manufacture of "Tetrafosfate," was found to contain 26.18 per cent total phosphoric acid, 17.94 per cent phosphoric acid soluble in 1 per cent citric acid solution and 2.43 per cent soluble in neutral ammonium citrate solution.

"Tetrafosfate," invented by Professor Stoppani of Bologna, Italy, is prepared or manufactured by heating together a mixture of the ground phosphate rock,

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magnesian-limestone, and soda ash and hydrating the mass. Our analysis of this product gave: total phosphoric acid 25.66 per cent, phosphoric acid soluble in 1 per cent citric acid 13.22 per cent and 2.07 per cent soluble in neutral ammonium citrate solution.

A fertilizer prepared by fusion of feldspar with basic slag was submitted to us for trial and analysis by Mr. H. S. Hammond, Macdonald College, Quebec. The laboratory results are as follows:—

	Phosphoric Acid.	Potash.
	p.c.	p.c.
Total.....	10.97	0.88
Water soluble.....	Nil.	0.22
Citrate soluble.....	7.62	—
One per cent citric acid	10.68	0.84

In our report for 1915 the results are given of our analysis of a potash fertilizer from feldspar; prepared by Professor C. W. Drury of Queen's University. Improvements in the method of manufacture, it is alleged, have been made since that date and the analysis of a sample received in February, 1919, afforded the following data:—

	Per cent.
Total potash.....	5.98
Potash soluble in 1% citric acid.....	5.75
Potash soluble in water.....	.26

THE FERTILIZING VALUE OF RAIN AND SNOW.

Following our practice since 1907, analysis has been made of every fall of rain and snow throughout the year, the object of the investigation being to determine the value of the precipitation as a source of available nitrogenous crop food.

The several determinations consisted of free ammonia, albuminoid ammonia and nitrogen as nitrates and nitrites. During the year 81 samples of rain and 29 of snow were analysed.

The total precipitation for the year ending February 28, 1919, was 35.59 inches (rain 27.77 inches, snow 7.97 inches) and the total nitrogen supplied thereby amounted to 5.845 pounds per acre.

Reserving the somewhat voluminous details for future publications the more important data may be summarized as follows, the results for the preceding year and the averages for the decade 1907-1917 being added for the purposes of comparison.

PRECIPITATION AND AMOUNTS OF NITROGEN FURNISHED BY RAIN AND SNOW.

	Total pre- cipitation in inches.	Nitrogen.		
		by rain.	by snow.	Total.
		Lbs. per acre.	Lbs. per acre.	Lbs. per acre.
Year ending February 28, 1919.....	35.59	4.929	.916	5.845
Year ending February 28, 1918.....	32.86	4.719	1.540	6.259
Average for 10 years ending February 28, 1917	33.17	5.482	1.101	6.583

The results from the past 12 years' work in this investigation, taken generally, indicate that the precipitation at Ottawa contributes from 6 to 6.5 pounds of available nitrogen annually per acre, of which 80 to 85 per cent is furnished by the rain. We may safely assume that this nitrogen is fully as valuable agriculturally as that in our more soluble nitrogenous fertilizers and would be worth at present prices 30 cents per pound. On this assumption the nitrogen supplied per acre by the rain and snow would be worth roughly \$1.80.

This investigation has brought out other features of scientific and hygienic interest in connection with the precipitation. The discussion of these may be deferred.

SOILS FROM IRRIGATION TRACTS IN ALBERTA.

The chemical and physical examination of soils from areas about to be placed under irrigation in Southern Alberta has been proceeded with and considerable progress made. This work has been undertaken at the request of the Reclamation Service, Department of Interior, to assist in the classification of certain areas into irrigable and non-irrigable lands. In addition to the determination of the "alkali" content of the soils and subsoils in question, a study is being made of the relation of alkali to crop growth and the influence of irrigation on the vertical distribution of alkali.

AGRICULTURAL METEOROLOGICAL RESEARCH.

This research, undertaken in co-operation with the Meteorological Service, has for its object the study of the influence of climatic and seasonal conditions on the yield and composition of crops.

Pressure of work requiring immediate attention has seriously interfered with the progress of this investigation, but the accumulating material is being so preserved that its study may readily be proceeded with when opportunity permits. Information of a valuable character to Canadian agriculture may undoubtedly be looked for as this work progresses.

SUGAR BEETS FOR FACTORY PURPOSES.

The numerous inquiries received during the past year from widely distant points in the Dominion, as to the possibility of the successful culture of the sugar beet crop and the establishment of beet sugar factories, may be taken as evidence that there is a keen interest at the present time in the development of this important industry in Canada. At the present time the only factories operating in Canada are those of the Dominion Sugar Company, located at Wallaceburg, Kitchener and Chatham, in south-western Ontario. From reports and statistics it would appear that the industry as carried on in these factories has been satisfactory and successful to both grower and manufacturer.

There are many factors to be considered before a decision can be arrived at as to the prospect for the successful operation of a beet sugar factory in any particular locality, and of these the suitability of soil and climatic conditions for the production of a root rich in sugar would appear to be of fundamental importance. Realizing the desirability of obtaining reliable data on this particular phase of the subject we commenced a number of years ago the systematic testing out of certain approved varieties of sugar beets on the several farms, stations and substations of the Experimental Farm system. This investigation ought to be of considerable value since it indicates year by year, the quality of the raw material of the industry—the sugar beet—produced in a number of localities in the several provinces of the Dominion, information of basic significance to those engaged in the serious study of the question as it may arise in various parts of Canada.

The principal varieties used last season (1918) in this investigation were Klein Wanzleben and Vilmorin's Improved, the seed being obtained from Messrs. Vilmorin, Andrieux et Cie., Paris, France, and "Russian" and "Canadian" from seed grown in Russia and Canada respectively and kindly supplied by the Dominion Sugar Co., Wallaceburg, Ont. The varietal averages, as obtained from the results of the analyses of the beets grown at the eighteen points throughout the Dominion, in respect to sugar content, are as follows:—

VARIETIES OF SUGAR BEETS, 1918.

	Sugar in Juice. (average).	of Purity. (average).
Klein Wanzleben..	16.59	84.19
Vilmorin's Improved..	16.62	82.74
Russian grown (variety unknown)..	15.99	82.03
Canadian grown (variety unknown)..	17.02	80.45

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These results furnish confirmatory evidence respecting the high quality of the beets from Canadian grown seed. As in 1917 the home-grown seed produced beets fully equal, if not superior, to those from imported seed.

In addition to the above, "Italian Grown" seed was sown at Ottawa, Ontario and Sidney, B.C., "Wohanka" (from seed imported from Russia) at Charlottetown, P.E.I., Ottawa, Ont., Lethbridge, Alta., and Agassiz, B.C., and "Raymond" (Alberta seed), at Lethbridge, Alta. The averages of these are as follows:—

	Sugar in Juice. (average).	Co-efficient of Purity. (average).
Italian, source of seed, Italy... ..	17.58	88.50
Wohanka, " " Russia... ..	16.94	87.13
Raymond, " " Alberta... ..	15.67	82.58

Averaging the results from the several varieties and arranging them according to locality of growth, we obtain the following interesting data:—

SUGAR IN JUICE IN SUGAR BEETS, 1918.

	Sugar in Juice. (average).
Charlottetown, P.E.I... ..	16.74
Kentville, N.S... ..	19.83
Nappan, N.S... ..	20.10
Fredericton, N.B... ..	17.99
Lennoxville, Que... ..	15.98
Cap Rouge, Que... ..	18.47
Ste. Anne de la Pocatière, Que... ..	10.93
Brandon, Man... ..	15.91
Rosthern, Sask... ..	15.25
Scott, Sask... ..	15.26
Indian Head, Sask... ..	14.11
Lethbridge, Alta... ..	15.94
Fort Vermillion, Alta... ..	19.96
Agassiz, B.C... ..	17.28
Summerland, B.C... ..	18.07
Invermere, B.C... ..	15.14
Sidney, B.C... ..	18.70
Ottawa, Ont... ..	16.86

Since, for the most part the same varieties were grown at each of the above Farms and Stations, the differences in sugar content to be noted in the foregoing are largely, but by no means entirely, due to seasonal characteristics. Though the results, taken as a whole, are not quite equal to those of 1917, they indicate that beets eminently satisfactory for factory purposes have been grown at a number of points throughout the Dominion. With a few exceptions these results give evidence of excellent quality and support the general deduction previously made in connection with this investigation (now in its eighteenth year) that in so far as the factor of quality is concerned very satisfactory beets could be grown in the larger number of our provinces.

FIELD ROOTS.

On an increasing number of farms, field roots, and more especially mangels and turnips, constitute an important factor in the ration of many classes of the live stock. And rightly so, for not only are they nutritious, palatable and readily digested, but they perform a useful function, by reason of their so-called medicinal qualities, in keeping the animals in a healthy, thrifty condition. But little attention however has hitherto been paid by the farmer to their specific value from the feeding or nutritive standpoint and since varieties may vary widely in this respect we have been obtaining data for a number of years past as to composition of the several varieties generally found upon the markets. Later, and more particularly during the past two or three seasons the quality of field roots as produced from Canadian or home-grown seed, has also been ascertained.

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The data of this investigation, now in its fourteenth year, are necessarily fragmentary and it will therefore only be possible in this summarized report to give a few of the more important results.

All the roots analysed were grown on the Experimental Farm, Ottawa, and consequently the results may be considered comparable in so far as the influence of seasonal conditions may affect the composition.

Mangels.—The series analysed comprised thirteen samples representing eleven varieties grown from seed produced at Charlottetown, P.E.I., Ottawa and Guelph, Ont., Kentville, N.S., Steveston, and Agassiz, B.C.

MANGELS—1918.

	Dry Matter.	Sugar in Juice.
Maximum..	13.76	7.82
Minimum..	9.73	2.84
Average for 13 varieties..	11.78	6.13
" 14 years..	11.03	5.73

The richest root contained 13.76 per cent dry matter and 7.82 per cent sugar in juice; the poorest in the series, 9.73 per cent and 2.84, respectively. These results are significant, representing as they do differences of no small magnitude in feeding value. The six varieties first in the series as to nutritive value were Yellow Leviathan, Gate Post, Yellow Intermediate, Royal Giant, Mammoth Long Red and Danish Sludstrup; all these were from Canadian grown seed and all contained over 12 per cent dry matter and 6.5 per cent or over, sugar.

Influence of Heredity in Mangels.—For nineteen years the "Gate Post" and "Giant Yellow Globe," two well known varieties, representing very distinct types of mangels, have been grown side by side at Ottawa and analysed, the object being to learn how far their composition may be influenced by transmitted character.

It is significant that throughout the whole period, without a single exception, the Gate Post has proved the superior variety. The summarized data are as follows:—

GATE POST AND GIANT YELLOW GLOBE MANGELS.

	Dry Matter.	Sugar in Juice.
Gate Post—1918 crop..	12.87	7.22
" average for 19 years..	11.77	6.17
Giant Yellow Globe—1918 crop..	9.73	2.84
" " " average for 19 years..	9.57	4.53

In these results we have satisfactory evidence that distinct varieties are able to transmit, in a marked degree, qualities or characters as to composition. The data further indicate that differences in feeding value of very considerable importance may exist and remain practically constant between varieties.

Turnips.—The series contained sixteen samples, representing twelve distinct varieties. Twelve of the fourteen samples were from Canadian grown seed, the localities of production being: Steveston, B.C., Ottawa, Ont., Cap Rouge, Que., Fredericton, N.B., and Kentville, N.S.

SWEDE TURNIPS, 1918.

	Dry Matter.	Sugar in Juice.
Maximum..	12.62	3.02
Minimum..	10.12	0.61
Average for 16 varieties..	11.18	1.06
" 13 years..	10.37	1.23

The averages, both for dry matter and sugar, are unusually high, partly due we presume to the small size of the root (average weight of one root 6 ounces) and partly to the favourable character of the latter part of the season for the development of sugar.

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The summarized data in this investigation are presented in the following table:—

AVERAGE COMPOSITION OF MANGELS, TURNIPS AND CARROTS.

	Period.	Dry Matter.	Sugar in Juice.
Mangels	14 years.	11.03	5.73
Turnips.	13 "	10.37	1.23
Carrots.	13 "	10.67	2.92

The season of 1918 at Ottawa was evidently favourable to the development of a rich root. This is shown by the fact that the percentages of dry matter and sugar in all three classes—mangels, turnips and carrots—are higher than the averages obtained from the investigation to date.

The general conclusion from the 1918 results confirms that of the previous season, that the field roots from Canadian grown seed have proved fully equal, if not superior, in feeding value to those from imported seed.

FEEDING STUFFS.

The feeds sent in by farmers for analysis and report during the year included mill feeds or chops, bran, shorts or middlings, ground screenings, cotton seed meal, oil cake meal, sugar beet meal, fish meals, brewers grains and combings, peanut meal, palm-nut cake meal and several calf meals.

One third of the samples received were oat products obtained in the manufacture of oatmeal or other breakfast foods. Though some of these feeds were of fair quality, (free from excess of hull and in some cases containing corn or other grain) a number were exceedingly poor, practically worthless, consisting essentially of oat hulls. The data may be summarized as follows:

	Protein. p.c.	Fat. p.c.	Fibre. p.c.
Maximum.	12.48	4.39	32.17
Minimum	1.40	0.53	8.94
Average.	7.64	2.65	20.58

The larger number of these feeds have been put on the market as a result of war conditions, which have greatly advanced the price of all feeding stuffs. Our analyses show a great variation in composition and unfortunately their feeding value cannot always be gauged by mere inspection. Especially is this true as regards those that are put upon the market in a finely ground condition. As many of them are sold at prices at little if anything below those of standard feeds, e.g. bran, shorts, etc., they should not be bought except on guaranteed analysis or a guarantee as to their real nature.

The list of feeds examined is too long to permit in this summary the inclusion of analytical and descriptive details, but information will be gladly furnished to those interested as to the composition of feeds on the market, as far as our data will make it possible.

In order to obtain a more complete knowledge of the feeding stuffs on the Canadian market, a series of samples has been collected throughout the Dominion. The series, comprising feeds of all kinds contains over 400 samples and is now in course of analysis. The completed work, owing to its extensive nature, should prove of particular value to farmers and stockmen generally. It is expected to publish the details in bulletin form and that the matter will be available for writing up during the present summer.

GRASSES.

A large series of cultivated-hay and pasture-grasses grown on the Central Experimental Farm, is in course of analysis. This work, which has been undertaken at the

instance of the Division of Forage Plants in connection with grass breeding experiments will furnish information as to the relative nutritive value of the grasses and also as to the stage of growth at which the grasses should be cut for hay.

MOISTURE CONTENT OF ROOT SEEDS.

For the safe storage of seeds—that they may neither mould nor heat—it is essential that they should not be moist or damp when put away in bags or bins. Assistance in this matter has been rendered the Division of Forage Plants and the moisture content of 154 samples of Canadian grown seeds—mangels, turnips, carrots—determined.

FLOUR.

The official examination as to moisture content of flours purchased in Canada by the British War Office, was entrusted to the Division in 1915 and has been carried on continuously since that date. In 1917 the Wheat Export Company were appointed the “Official Agents of the Allied Governments” and took over the purchasing of the flour for civilian and military use overseas. To this body our results are now reported.

More than 4,000 samples were submitted for analysis during the year. This has entailed a very large amount of analytical work but the results have been of great value to the Empire and the Allies, not only in effecting an enormous saving—amounting to tens of thousands of dollars—but in controlling the moisture content of the flour and thus ensuring its good keeping qualities under conditions of transportation and storage.

MEAT INSPECTION DIVISION.

The work in connection with the examination and scientific control of packing houses and canning products, submitted by the Meat Inspection Division, Health of Animals Branch, for the year 1918-19, has included 2,691 samples, the classification of which may be given as follows:—

Lards, tallows, oils, butters and oleomargarine.. . . .	329
Preserved meats.. . . .	10
Colouring and dyestuffs.. . . .	3
Preservatives.. . . .	36
Spices and condiments.. . . .	2
Evaporated apples and apple waste.. . . .	680
Condensed milks.. . . .	1,514
Miscellaneous.. . . .	117
	<hr/>
	2,691
	<hr/>

The new feature of commercial interest in the work has been the chemical and physical examination of a large number of samples of condensed milk. In addition to the determination of total and milk solids, butter fat, etc. incubation tests have been made in order to obtain evidence as to presence or absence of bacteria, moulds, yeasts, etc. This work has been carried out in as practical and thorough manner as possible, and its results, it is considered, have been of value in a more careful and rigid control in the manufacture of the milk, more particularly as regards net weight in tins, “thickened” and “sandy” milk and mould contamination.

A considerable amount of investigatory work has been done in the examination of oils for denaturizing inedible fats and as a result it is thought that the consumer will be more thoroughly protected in this respect in the future.

Preliminary work of an investigatory character has been carried out to ascertain the cause of the dark colours sometimes encountered in canned corn. This inquiry will be continued next year with the co-operation of the packers.

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STAMP CANCELLING INK.

At the request of the Postmaster General a chemical and physical examination was made of the inks at present in use by the Post Office Department with view of determining their suitability for cancelling stamps. The nature and proportions of the various ingredients were ascertained and the nature and indelibility of the impressions therefrom were rigidly tested.

The Division, as a result of this preliminary work, has devised an ink which is at present under practical test by the Post Office Department. In composition and properties it differs widely from the inks now in general use, possessing, it is considered, better physical properties and far greater relative indelibility. At the time of writing a final report on this ink has not been received from the Post Office authorities.

WATERS FROM FARM HOMESTEADS.

That there is no more important and valuable asset on the farm than an ample supply of pure water is a fact largely recognized to-day throughout the length and breadth of the land. In considering the purity of any particular supply we wish to point out that while there are many well waters so seriously polluted as to need no analysis to condemn them—their condition at once stamping them as polluted—there are on the other hand many that are unsafe and dangerous and yet remain inoffensive to sight, smell and taste. It is for these that analysis is particularly necessary to discover their true nature. A water may be bright, clear and odorless and yet highly polluted. Our work has shown that it is the improperly placed shallow well that is most to be feared; at any time it may become a source of danger to the health of the farmer, his family and his live stock. If there is no natural, pure source available, the safest supply is the deep driven or drilled well so located as to be beyond the possibility of local contamination.

The waters examined during the past year may be classified as follows: pure and wholesome 33 per cent; suspicious and probably dangerous 15 per cent; very seriously polluted 29 per cent and too saline to be potable 33 per cent.

The analysis of a farmer's water supply is made free of charge but express charges on the sample must be prepaid. Those desirous of availing themselves of this offer should first obtain from the Division of Chemistry an application form which gives directions as to the collection and shipment of the sample.

DIVISION OF BOTANY.

REPORT OF THE ACTING DOMINION BOTANIST,
J. H. GRISDALE, B.AGR., D.Sc.A.

DESTRUCTIVE INSECT AND PEST ACT.

The white pine blister rust investigations as well as the potato inspection carried on during the year, have been continued by the use of funds voted under the Dominion Destructive Insect and Pest Act. The following is a brief summary of the work carried on with this appropriation.

WHITE PINE BLISTER RUST.

Scouting.—During 1918 an attempt was made to ascertain the extent of the disease outside Ontario and Quebec. The results for the season indicated no disease in British Columbia, Manitoba and Saskatchewan, Northern Ontario and New Brunswick. In the Niagara Peninsula the disease was present as usual. In Quebec, blister

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rust was reported on the north bank of the St. Lawrence, but none in the Ottawa valley or along the International boundary line. The results of the scouting in 1918 would indicate that the disease is still confined to Southern Ontario and Quebec.

Control Areas.—During the summer, four experimental control areas were established, one in the Niagara Peninsula near Fenwick, one at Bowmanville on the north shore of Lake Ontario, one at Carillon near Montreal and one at Berthierville, in Quebec. A fifth area was planned for Lotbinière county in Quebec, but could not be completed. In the four areas mentioned all wild and cultivated ribes were removed from the pine woodlots and around them for a distance of 500 yards. Observations in various localities indicate that the infection will not readily cross a strip of this width.

Damage to Pines.—In order to determine the damage which has already resulted from the disease in those districts which are known to have been infested for some years, a limited pine survey was made in Ontario during the summer. This survey covered only the trees in woodlots up to ten or twelve feet in height. All these trees were counted and a record made of all those which bore blister rust infections. While there is considerable variation in different woodlots, the total percentage of infection is rather small; in the Niagara Peninsula 270 pines were found to be diseased out of 11,279 examined in 22 woodlots. Three of these woodlots showed no disease, and the general percentage of infected pines is only 2.3 per cent. In the Oakville district and in Simcoe county, some 2,849 pines were likewise examined in 13 woodlots. Only one diseased pine was located in these. Since the general conditions, especially in the Niagara Peninsula, are quite favourable to the spread of the disease owing to the immense number of wild ribes and cultivated black currants, the comparatively small amount of pine infection found after at least four years of exposure leads us to hope that, under favourable conditions, losses from the disease may be kept at such a minimum that the growing of pines on a commercial basis will still be possible.

It is apparent from the results of this survey that these factors are concerned in infection of pines:—

- (1) The nearness of cultivated ribes, particularly black currants.
- (2) The number of wild ribes present.
- (3) The moistness of the situation.

It has been found that on swampy land, wild ribes are plentiful and luxuriant, and become infected very completely, while in higher and drier situations they are less plentiful and the infection is often negligible.

Research.—Some very interesting results were obtained by Mr. Geo. H. Duff on the effect of ultra-violet light and sunlight on the acidiospores and uredospores of the blister rust fungus. Exposure to ultra-violet light for a short time (2½ minutes) was fatal to the germinating capacity of these spores. When exposed to sunlight under glass however, they survived exposures as long as five hours.

In continuation of the work done last year on the rate of fall, in still air, of the uredospores, a similar determination was made on the rate of fall of the acidiospores of the rust fungus. It was found that the rate of fall was practically the same for both, the acidiospores dropping in still air through a distance of eight feet in a little over seven minutes. If this result is considered in connection with the rate of motion of an ordinary breeze, it becomes evident that these spores can readily be carried to distances of many miles.

POTATO INSPECTION.

Potato inspection and certification was conducted in the following provinces: Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario. Fields to the number of 3,288, comprising 9,996 acres, were inspected for seed purposes, and 989

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fields, comprising 2,920 acres, were passed as fit for No. 1 seed. Up to December 31, 1918, 43,500 bushels of No. 1 seed had been shipped at prices about 50 per cent in excess of the price of table stock.

An extensive survey was made in Southern Ontario to determine the extent to which seed-borne diseases were present. This work extended to 1,336 fields, made up of 2,339 acres in 32 counties, and disclosed the presence of very large percentages of leaf roll and mosaic; diseases which reduce the yield to about one-third and two-thirds of the normal, respectively. A preliminary survey was also made in Manitoba and Saskatchewan, which disclosed the need for further work.

FIELD LABORATORIES.

St. Catharines.—Following one of the severest winters on record, which caused considerable injury in orchards, spring and summer were normal until about July, when pronounced drought set in. The conditions in fall were cooler, with more precipitation.

The white pine blister work, which, owing to the location of this field laboratory within the zone of infection, is carried on under the immediate supervision of the officer in charge, is reported on briefly under the section "Destructive Insect and Pest Act."

Among the principal investigations of this laboratory may be mentioned Brown Rot of Stone Fruits, Strawberry Mildew, Raspberry Leaf Curl, Silver Leaf, and Bacterial Leaf Spot of Peach.

Besides the numerous addresses on various phases of plant diseases usually given during the winter, a series of illustrated addresses on plant diseases was arranged for the Agricultural Short Courses in various counties. In addition, a more comprehensive course on the subject, consisting of ten lectures and four laboratory periods, was put on for the Agricultural Short Course held in St. Catharines. The results of this more extended course were very encouraging, and it is hoped that more work of this kind can be attempted in future years.

A series of press articles on various subjects pertaining to plant diseases was prepared during the year, and there were also issued two bulletins, one of Peach Canker (No. 37, Second Series), and one on Tomato Diseases (No. 35, Second Series). In addition, a section on strawberry diseases was written for inclusion in a strawberry bulletin to be published by the Division of Horticulture.

Charlottetown, P.E.I.—*Experiments and Laboratory Investigations on Potato Diseases.*

Experiments on leaf roll showed that the disease can spread at an alarming rate in the field, even under conditions as favourable for potatoes as those at Charlottetown.

A series of experiments on leaf roll and mosaic was begun, in collaboration with the Central Laboratory at Ottawa and the respective Superintendents at Charlottetown, Kentville, Nappan, Fredericton, Lennoxville, Brandon and Indian Head, as well as on a private farm at Fort William, Ont. Other investigations dealt with curly dwarf, wilt diseases and powdery scab.

Potato spraying demonstrations were conducted on twenty-one farms in Prince Edward Island with a horse-power and a hand-power sprayer. The growers who used the former machine estimated that their yields were increased on the average by $77\frac{1}{2}$ bushels per acre, and those who used the latter estimated the increase at 40 bushels on the average. In addition to this, the amount of rot was cut down from as high as 40 per cent of the crop to practically nothing.

A demonstration on a large scale was conducted at the Experimental Station, Charlottetown, on the control of loose smut of wheat and barley with hot water. The amount of smut was reduced from as high as 65,000 heads per acre, to very small proportions.

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The officer in charge delivered a number of lectures, and otherwise interested himself in extension and demonstration work. Several meetings were attended.

A report on potato inspection and certification, carried on under the supervision of the officer in charge, is reported under the section "Destructive Insect and Pest Act".

Fredericton, N.B.—The following are the chief lines of work carried on during the year: Field and laboratory research on the control of bean, pea, potato and wheat diseases; a study of methods for storing turnip stecklings in order to avoid rot; a preliminary field survey of root and vegetable diseases in New Brunswick, Quebec and Ontario; a forest disease survey and study of some of the more important forest diseases in New Brunswick and Quebec, for the purpose of locating good seed; inducing and assisting farmers to maintain potato seed plots for the control of potato diseases; potato spraying demonstrations.

Experiments on hand-selection, seed treatment, varietal resistance and spraying for the control of bean anthracnose, and a similar series of experiments dealing with leaf spot and root rot of peas, have given promising results.

Storing turnip stecklings.—Great quantities of turnip stecklings stored in the fall of 1917 for seed production, rotted in storage or failed to grow after being set in the field. This condition appears to have been brought about by over-heating in storage. Experiments commenced last fall, including storing stecklings in barrels, crates, bins of different dimensions, and three forms of field pits, indicate that they may be most safely and economically stored on shelves 12 to 15 inches deep in a well ventilated cellar where the temperature is held below 35 degrees F.

Glume Spot of Wheat (Septoria glumarum Pass).—Investigations on glume spot of wheat included 82 plots consisting of experiments on date of planting, source of seed, good and poor seed, varieties, seed treatment and soil treatment. The results, while inconclusive, emphasize the importance of planting early and using good seed in the localities where disease is likely to occur.

Potato Inspection.—During the summer, 3,020 potato fields were inspected in New Brunswick and Quebec.

GRAIN DISEASE RESEARCH.

Work was carried on during the summer of 1918 chiefly at the Brandon laboratory.

Miss Margaret Newton carried on greenhouse cultures at Manitoba Agricultural College for a few months during the summer under the direction of the Brandon laboratory, chiefly to determine the relationship of the stem rust in the native and wild grasses to that of the wheat rust. She also aided in field observations on grain rusts and other diseases.

The work at Brandon consisted chiefly of experiments and observations with the object of determining the method of wintering, and spread of the stem rust (*Puccinia graminis*). Some attention was given to locating the common barberries in Western Canada and the part played by these shrubs in the spread of the stem rust.

Experiments were also carried on to determine the life history and method of control of the stripe disease of barley (*Helminthosporium gramineum*) and the smut of western rye grass.

The season at Brandon was very dry and the experimental plots were so severely injured that the results of the experiments were seriously affected.

There was a considerable development of rust in Southern Manitoba, and much injury was done to late grain. Some experiments were tried to determine the best time for cutting severely rusted wheat, but the results were not conclusive.

Experiments were also undertaken to determine the life history of the leaf rust of wheat (*Puccinia triticina*) and its relation to the closely allied rust on many grasses.

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In concluding the report, mention may be made of the free distribution of nitro-cultures prepared at the Central laboratory, which was continued during the year. Reports received from the users of our cultures throughout the Dominion, confirm the opinion that their use is beneficial to leguminous crops. The benefits indicated are, earlier maturity, better stands, larger yields and, in the case of alfalfa, increased resistance to winter killing. However, the very severe winter caused great damage to fields; many reports tell of promising stands having been frost-killed or ruined by prolonged wet spells.

In addition to the regular routine and increasing executive work, the Central laboratory commenced a study of the effect of chemical treatments of ergot grain as a means of eliminating any danger from the presence of ergot in seed grain.

Interesting results were also obtained from experiments relating to the control of leaf stripe of barley (*Helminthosporium gramineum*). This disease appears not to respond appreciably to the usual methods employed in treating seed grain.

The work in connection with a comparative study of the organism causing common scab in potatoes, and several other investigations are being continued.

GENERAL AND SYSTEMATIC BOTANY, 1918-19.

During the year there were the usual enquiries about weeds, poisonous plants, medicinal plants, etc. About 629 specimens of plants were received for identification. Among the miscellaneous enquiries were letters relating to cocoa-nuts, olives, and Sphagnum moss.

Some additional specimens were added to the herbarium, and considerable additions were made to the collection of living plants in the arboretum. Special mention deserves to be made of the American Lotus (*Nelumbo lutea*), living roots and dried specimens of which were donated by Mr. A. H. Richardson, St. Williams, Ont.

Copies of our annual exchange list of seeds were sent to 52 of the leading botanical gardens throughout the world. During the year 649 packets of seeds and roots were sent out to various persons in Canada and to foreign botanical gardens and 347 packets of seeds were received.

Climatic tests were again carried out with Castor Oil bean (3 varieties), Soy bean (4 varieties), hemp, sunflower, black mustard, white mustard, lentil, Chick pea, fenugreek, and opium poppy all of which ripened seeds satisfactorily.

Press articles on chicory, Soy beans, the control of weeds by chemical sprays, and various other topics were prepared and a bulletin on the poisonous plants of Canada, by Miss F. Fyles, was handed in for publication.

THE CEREAL DIVISION.

REPORT OF THE DOMINION CEREALIST,
CHAS. E. SAUNDERS, B.A., Ph.D.

THE SEASON.

To the erratic weather conditions of the 1918 crop season that prevailed over large areas of Canada must be attributed the low yields of cereals in some of the greatest grain-growing provinces. In British Columbia, Prince Edward Island and Nova Scotia, the conditions more nearly approached the normal, although in certain portions of British Columbia damage was caused by drought in the early part of the season. Throughout the prairie provinces, most unusual weather prevailed. Seeding was accomplished under favourable conditions, but May, June and the early part of July were much too dry, and in consequence all grain growth was seriously injured. Light rains in July partially offset this disadvantage, but a heavy frost on July

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24, 25 and 26, swept the northern sections, and practically ruined a large part of the crop. The southern parts of the provinces escaped lightly, and abundant rains at the end of July assisted materially in the improvement of the yield.

In Ontario seeding conditions approached the normal. Harvesting weather was favourable until the latter part of August, when heavy rains set in and prevented the successful handling of all late sown grains. At the Central Farm, the seeding was done promptly in the spring, and harvesting was completed before the worst of the rainy period arrived.

Throughout the eastern provinces the season was rather cool and backward but good yields were generally obtained, though the quality of the crop was often lowered by excessive rain. Prince Edward Island had an exceptionally fine crop.

NEW VARIETIES OF CEREALS.

Ruby Ottawa 623, spring wheat which was introduced last spring, suffered severely, as did all other grains, in some of the districts to which it was sent. The unusual drought and frost caused many failures but in spite of these drawbacks Ruby did well in other instances, and in some cases seemed to show special ability to resist frost. This variety, while not exactly drought-resistant, does not seem to be specially susceptible to drought. During the past winter, a large number of samples have been sent out. This variety has already shown its suitability for some of the northern sections of Canada where Marquis ripens too late. In districts where wind is not feared, Ruby will have the additional advantage of threshing out more easily than Marquis, though, of course, in windy districts this means that Ruby cannot be allowed to stand as long in the field uncut as Marquis. A certain amount of Ruby was available this season for sale as seed to those farmers who wished to start with a larger quantity than the usual free sample.

The new hullless oat, Liberty, Ottawa 480, which was announced a year ago, was distributed in very small quantities last spring as the stock of seed on hand was strictly limited. This winter the amount of seed was still small but samples were available for quite a number of farmers in different parts of Canada who were anxious to obtain this remarkable and promising variety. The indications are that the Liberty oat will prove a very valuable addition to the varieties grown in this country and will fill a distinct gap. The most encouraging reports received, as the results of last season's tests, were from Langley Fort, B.C. (Mr. Chas. E. Hope), and from Hathersage in northern Alberta (Mr. J. G. Hicks). Mr. Hicks' plot yields at the rate of about 64 bushels per acre, equivalent to about 91 bushels per acre of a variety retaining its hull. These oats withstood very well the severe frost which occurred at the end of July. Arrangements have been made to grow a larger area of Liberty oats this season so as to have a quantity more nearly adequate to meet the demand next year. The value of this variety as a cheap source of excellent feed for young chickens and young pigs is making it eagerly sought for.

Another new variety about which not much has yet been said is Albert, Ottawa 54, barley. This is an extremely early ripening six-row sort which is valuable whenever maximum earliness is required. In spite of being so early it gives a very fair yield of grain and it is hoped that it may prove particularly useful in combating wild oats in the Prairie Provinces. Albert has been derived by selection from a cross-bred barley produced in the early history of the Experimental Farms.

A new strain of beans selected from a variety obtained many years ago from Norway is now being introduced under the name "Norwegian, Ottawa 710." This is a yellowish brown bean of medium size and rather long in shape. It is extremely early in ripening, usually requiring ninety days at Ottawa. It is expected to prove valuable in many districts in Canada where the cultivation of beans has not yet been taken up. A few samples only of this sort were sent out but arrangements are being made for a larger distribution next season.

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A new selected field pea under the name of Mackay, Ottawa 25, has been derived from the Mackay variety which was originated at Ottawa many years ago. This pea has proved remarkably productive and, although somewhat late in ripening, it is early enough for most of the well-settled sections of Canada. The distribution of this variety will not be possible for a year or two yet as the quantity of seed on hand is still very small.

A new flax selection under the name of Novelty, Ottawa 53, will, in all probability be available for distribution next winter. This variety has shown exceptional productiveness for seed purposes. Another selection also made by the Dominion Cerealists to which the name Longstem, Ottawa 52, has been given, is extremely promising for fibre production. The tests which have been made show that it is of the very finest quality for fibre purposes though it does not give a large crop of seed and is not recommended at all for seed production. It is hoped that the distribution of the Longstem flax will be possible next winter.

OLD VARIETIES REJECTED.

The duty of encouraging the growth of the best varieties seems to imply the duty also of endeavouring to discourage the farmers from growing varieties which have been shown to be inferior. From time to time, therefore, announcements are made advising the farmers to discontinue the use of some well-known sort. Some time ago it was announced that the oat called Abundance, or rather the variety most commonly grown under the name—for there seem to be at least two sorts so called—had been sufficiently tested and found not quite equal to the best standard sorts such as Banner. The farmers were therefore advised to discontinue it. This year the tests of White Fife wheat were regarded as complete and advice has been sent out to the effect that this variety should no longer be grown under ordinary conditions as it has no advantage whatever over Red Fife, and Canadian red wheats usually find a better market than white varieties. The Cerealists are aware that in attacking varieties which are popular in certain parts of Canada he has a difficult task before him. Nevertheless it seems to be an integral part of his work, because the best progress can never be made by the introduction of new varieties unless the farmers can be persuaded to discontinue the growing of the old, inferior sorts.

DISTRIBUTION OF SAMPLES OF SEED GRAIN.

There is an increase this winter in the number of free samples sent out, arrangements having been made to enlarge the distribution somewhat, as it was felt that the wishes of the farmers should be more fully met than they have been in recent years. It is a pleasure to record the fact that, as time goes on, the applications received from the farmers are decidedly improving in quality, more information being given to us and the needs of the applicants being more clearly stated so that we are in a position to choose more intelligently a variety likely to give satisfaction. While some of the seed for distribution this year was not as plump as usual, owing to the excessive drought in central Canada where some of the grain was grown, nevertheless most of our grain was of very good appearance besides being of the highest standard of purity and of unexceptionable pedigree. The seed for the distribution of the past winter was obtained from the following experimental farms: Indian Head, Sask., Rosthern, Sask., Brandon, Man., Cap Rouge, Que., Ste. Anne de la Pocatière, Que., and the Central Experimental Farm at Ottawa.

TESTS OF VARIETIES OF CEREALS.

The usual cereal tests were conducted at Ottawa and at the majority of the branch Experimental Farms and Stations. The results obtained were satisfactory in some

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instances but very severe weather conditions and other causes reduced the value of the tests at several of the Stations. In order to prosecute the work of the Cereal Division more rapidly it would be advantageous to enlarge greatly the scope of these tests and to provide more expert assistance for the supervision of the work and the taking of the necessary notes during the growing and harvesting season.

GRAIN PLOTS AT OTTAWA.

In order to give some idea of the amount of work which is being done, the following particulars are presented in regard to the varieties and selections under test at Ottawa last season. In the regular tests there were 290 plots of spring wheat, 23 of emmer and spelt, 84 of oats, 274 of barley, 6 of rye, 31 of flax, 41 of beans, 72 of peas and 86 of buckwheat, making a total of 907. Besides these regular plots of $\frac{1}{120}$ acre, there are still smaller plots of unfixed cross-bred varieties and of fixed varieties and new strains which are in the early stages of propagation, of these there were as follows: 212 small lots of varieties not fixed and 754 small lots of varieties for propagation. Furthermore, in the larger propagation areas, where the varieties intended for test at the branch farms and for distribution to the public are being grown, there were 37 plots.

The total number of plots of all sizes was 1910.

MILLING AND BAKING RESEARCHES.

The usual milling and baking work with new wheats from the test plots of cross-bred and selected varieties at Ottawa occupied the greater portion of the time of the assistant in milling and baking. The most promising sorts grown at the Branch Farms were also tested including wheats from Lacombe, Alta., Beaverlodge, Alta., Indian Head, Sask., Brandon, Man., Ste. Anne de la Pocatière, Que., and Nappan, N.S. This test work involved the milling and baking of 100 varieties. Experiments with substitute cereal flours were continued, it being found that the majority of cereal flours and meals could be made up to twenty per cent. in the production of a loaf with little or no detrimental effect on the quality of the product. Samples of loaves containing 20 per cent of other cereal flours were exhibited at the Central Canada Exhibition at Ottawa. Many questions were asked and advice given by the assistant in charge as to the use of substitute flours in bread making and methods of using "government standard" flour.

A new series of experiments on the effect of age in flours and wheats was started in 1918. Millings made as soon after harvest as possible and also two months after harvest furnished the bulk samples of flours for storage. Unmilled wheats of the same lots were also placed in storage at the same time, portions of these samples will be milled and baked at the same times as the stored flours. This experiment is planned to cover a period of 18 to 20 years, results of previous tests having shown that both wheat and flour can be kept in excellent condition for at least 12 years.

An experiment on the cutting of wheats at different stages of maturity was also carried out. These cuttings were made 12 and 4 days before the wheat was ripe, on the day when ripe and 5 days after ripening. All samples were milled at the same time and baked together. The results were somewhat variable, but showed a gradual improvement in strength of flour as the date of maturity was approached. This experiment will be repeated.

During the year April 1, 1917, to March 31, 1918, 122 samples of wheat were milled and 810 test loaves were baked, 120 of these being tests with substitute flours of various proportions.

DIVISION OF FORAGE PLANTS.

REPORT OF THE DOMINION AGROSTOLOGIST, M. O. MALTE, PH.D..

Owing to the necessity of devoting a very large proportion of time and energy to the production of field root seed on a commercial scale for the purpose of safeguarding against a threatening shortage in the supply, the division found it impossible to proceed with much of its usual work in a normal manner. Variety tests were conducted with mangels, swede turnips, carrots, and sugar beets as usual, although on a much reduced scale, but the breeding of grasses and clovers which, on account of its very nature, requires much detail work calling for time-absorbing manipulations and observations, had of necessity to be very much curtailed. However, some of the phases of the breeding work, viz: such as required the least amount of detail work, were followed up and will be reported upon in the following.

VARIETY TESTS.

A total of 32 varieties of field roots, including 16 varieties of swede turnips, 13 varieties of mangels and 3 varieties of field carrots, were tested at the Central Experimental Farm.

The season was very unfavourable to swede turnips and, as a result, the yields obtained were very low, the average of 16 varieties being 10 tons 863 pounds to the acre. Mangels did better, the average of 13 varieties being 28 tons 1,453 pounds. Carrots gave very heavy yields; the average of three varieties was not less than 31 tons 266 pounds per acre, one of the chief reasons for this heavy yield being that the carrots were allowed to grow very thickly.

In respect to the quality of the commercial varieties the same observation was made this year as the two last ones, i.e. that most of the so-called varieties were deplorably lacking in uniformity and, in many instances, were so badly off-type that the true type of the variety which the name indicated could be found only in a very small percentage of the roots.

FIELD ROOT SEED GROWING.

Yield per acre under different conditions.—Previous experiments conducted with mangels have shown that the yield of seed per acre is greatly influenced by:—

1. When the seed roots are planted, and
2. The state of fertility of the soil.

It has thus been found that the best and heaviest mangel seed crops are obtained when, other conditions identical, the seed roots are planted as early in the spring as possible. It has further been shown that the yield per acre is greatly increased if the land is in a good state of fertility, an application of a liberal amount of chemical fertilizer together with 15-20 tons of manure to the acre increasing the seed yield considerably when the land on which the seed is being raised is somewhat low in fertility.

In order further to study the effect of factors influencing the mangel seed yield, an experiment was planned this year combining the use of different rates and combinations of chemical fertilizers coupled with different rates of manure, the planting of the seed roots at different distances, and the use of small and full-grown roots as seed roots. The experiment, which included a total of 96 plots, brought out, in the first place that an application of 20 tons of manure to the acre increased the seed yield most conspicuously, whether applied alone or in combination with chemical fertilizers.

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BREEDING WORK.

As already stated, the breeding work with forage plants had of necessity to be curtailed owing to the large amount of time and labour spent on emergency root seed production. Only the most elementary and least time-absorbing breeding work could be attended to and, for this reason, little progress can be reported. In the following a brief account will be given, however, of two cases of forage plant breeding, the more as they represent several year's work the results of which now begin to appear.

Breeding of Red Clover.—Actual breeding work with Red clover was taken up by the Division of Forage Plants in 1913 and was founded on the well-known fact that red clover displays an extremely high degree of variability. All so-called "varieties" of red clover consist, as a matter of fact, of a very great number of forms differing from each other not only in respect to characters easily discernible to the eye, such as mode of growth, stooling after cutting, shape of leaves, colour and shape of seed, etc., but also in respect to certain other properties which only close observations may reveal, for instance ability to withstand severe winters, and ability to live more than two years. Under the circumstances it follows that, if the various characteristics of the different forms are transmitted from one generation to the next one in accordance with the laws of heredity in plants, red clover should furnish abundant natural material for improvement work, and also that it ought to be possible to develop a very large number of new varieties.

However, on account of red clover plants refusing to set germinable seed, unless the flowers are cross-fertilized by pollen from other red clover plants, it is evident that the breeding methods which apply, for instance, to the self-fertilizing cereals cannot be used to the same advantage in red clover. Whereas it is a very easy thing to develop perfectly uniform and constant varieties of the cereals, it is extremely difficult to do so in red clover for the reason that every red clover plant is by necessity the result of a cross between two individual plants.

In planning the breeding work with red clover in 1913, the Division therefore decided to resort to a system of mass-selection whereby as uniform "varieties" as possible could be developed.

As it is of primary importance to red clover growers in Canada that the red clover used possesses what is called hardiness, that is to say ability to survive severe winters without being killed to such an extent that the yields are seriously affected, the Division started its breeding work with the object of developing, if possible, a winter-hardy strain. When this had been accomplished, the Division, it was planned, should go further and endeavour to breed, from within the winter-hardy strain, new varieties possessing qualities making them also in other respects superior to the so-called varieties obtainable through the trade.

When undertaking the breeding work for hardiness, the Division had also in view the developing, if possible, of a clover strain of a perennial nature, that is to say of a strain capable of yielding remunerative crops for more than one year. For this reason the breeding work was started with a few individual plants which, according to observations, had lived through at least four winters.

In 1915, some seed was gathered, and as it was thought to represent a hardy strain of a perennial nature, it was sown in test plots in 1916. In 1917, one hay crop and one seed crop were taken. In 1918, two satisfactory crops were again taken from the very same plants which yielded one hay crop and one seed crop in 1917, and, judging from observations in the early spring of 1919, a great majority of the plants which started life in 1916 will continue to live in 1919 also.

Under the circumstances the Division may be considered justified in claiming to have developed a perennial red clover, capable of producing full crops for at least two, and probably three, consecutive years.

This perennial clover is now being propagated for extensive comparative tests.

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Western Rye Grass.—This grass, botanically known as *Agropyron tenerum* Vasey, has been closely studied, comparatively speaking, in its wild state for several years. It is of special interest not only on account of its value as a hay grass in the Prairie Provinces, but also botanically because it occurs in a vast multitude of forms, many of which appear to be connecting links between it and certain European and alpine-arctic species.

The first selection of Western Rye grass material for breeding work was made in 1912 when a few individual plants were collected at Indian Head, Sask. and brought to Ottawa for further study. Some of them were allowed to go to seed without any precaution being taken against possible cross-fertilization. When the plants coming from this seed develop, a surprisingly great uniformity was observed in the progeny of the individual mother plants. In other words, the Western Rye grass plants were breeding either perfectly true to type, or almost so..

In order further to ascertain whether the different forms of Western Rye grass and allied species normally breed true to type, a collection of ripe seed from individual plants was made in the fall of 1916 at Calgary, Alta., where, within areas of only a few square rods in size, dozens of different forms can be found growing topsy-turvy. The seed collected was, in fact, taken from plants representing widely different forms, which grew so close together that a person could collect the seed from two or three of them without moving.

The seed thus collected was sown at Ottawa in 1917, and later a number of the seedlings obtained were transplanted in rows, each row representing the progeny of one single plant. In 1918, when the plants had reached full size, it developed that, in all cases, the various forms selected at Calgary, 1916, as mother plants, were breeding true to type.

That the Western Rye grass forms should breed true to type was expected, for, according to observations made at Edmonton in the early summer of 1916, automatic self pollination is the rule in Western Rye grass. In this respect the Western Rye grass behaves like wheat, to which it, as a matter of fact, is rather closely related botanically. Under the circumstances it follows that it will be just as easy to "breed" hundreds of distinct and constant varieties of Western Rye as it is to develop wheat varieties.

In order to secure suitable material for the breeding of Western Rye varieties adapted to different parts of Western Canada, a collection of living plants, representing about one hundred different types of Western Rye, was made in 1918. The various types, which were collected in Manitoba, Alberta, and in the Okanagan Valley in British Columbia, were shipped to Ottawa and transplanted. They all came through the winter of 1918-19 and will be used for practical breeding purposes, and also, as far as it can be accomplished, as material for studying the laws of inheritance of botanical characters in grasses.

DIVISION OF ILLUSTRATION STATIONS.

REPORT OF THE SUPERVISOR, JOHN FIXTER.

In 1918 seeding began about two weeks earlier than in 1917. The soil had plenty of moisture and was in a good state of cultivation. The seed germinated rapidly and made good growth until about June, when continuous dry weather, accompanied by very strong winds, checked the growth and in some cases caused a complete failure.

ILLUSTRATION STATIONS IN SASKATCHEWAN.

Assiniboia.—Operator, P. J. H. Warren. The season of 1918 opened up April 13. The soil was moist and in a fine state of cultivation. The grain germinated rapidly.

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Although continuous dry weather prevailed through the growing season, fair crops were harvested. Wheat sown April 11 was harvested August 30, and Oats sown April 11 were harvested August 31. Two fields were summer-fallowed, costing \$4.85.

	Yield per acre.	Standard Cost.	Actual Cost.
	B.	Cts. per bu.	\$ ct per bu.
Wheat after fallow	11	.30	.36
Oats after oats.....	13	.26	.30
Wheat after fallow.....	13	.80	1.07
Oats after fallow.....	12	.29	.30
Wheat after fallow.....	17	.65	.80

Biggar.—Operator, Dr. S. E. Shaw. The season of 1918 opened up about the usual time, with a good supply of moisture in the soil. The seed was sown on a well prepared seed-bed and germinated readily. High winds and spring frost checked the growth. The exceptionally dry weather with frost July 24 was the cause of crop failure at this Station.

Davidson.—Operator, Reuben Lloyd. This Station was started in the spring of 1918. The land having been cropped previously, it was all summer-fallowed in 1917. The season of 1918 opened up for seeding April 26. The soil was in excellent condition with plenty of moisture. Seed germinated readily and made good growth. Wheat sown April 26 was harvested August 26 and oats sown April 29 were harvested August 30. Two fields were summer-fallowed in 1918, costing \$4.48 per acre.

	Yield	Standard	Actual
Wheat after fallow	13 bu.	\$1.03 per bu.	\$1.22 per bu.
Wheat after fallow	15 bu. 12 lb	.78 "	.93 "
Wheat after fallow.....	9 bu. 12 lb.	1.04 "	1.46 "
Oats after fallow.....	26 bu.	.40 "	.48 "
Oats after fallow.....	22 bu. 18 lb	.45 "	.52 "
Oats after fallow.....	27 bu.	.42 "	.50 "

Herbert.—Operator, Milton Holmes. Seeding began about three weeks earlier than in 1917. The soil was in excellent tilth. Although the moisture line was low, grain had to be sown deeper than usual. Wheat sown April 11 was harvested August 8. There was an exceptionally light rain-fall during the growing season, thus reducing the yield per acre. A heavy frost July 24 injured the quality and also lowered the yield of the grain. The value of extra good cultivation and good seed is more noticeable each season. Three fields were summer-fallowed in 1918, costing per acre \$6.50, \$6.26 and \$6.02.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow	10 bu.	\$1.10 per bu.	\$1.32 per bu.
Wheat after wheat	2 bu.	3.64 "	4.59 "
Wheat, seeded with Rye Grass	10 bu.	1.08 "	1.27 "
Oats after wheat	8 bu.	.90 "	1.08 "
Oats after corn and wheat.....	8 bu.	.73 "	.93 "

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Lloydminster.—Operator, Hugh Hill. The spring opened up earlier than in 1917, with plenty of moisture in the soil. The grain was sown on a well-prepared seed-bed and made good growth up to July 24, when a heavy frost visited this district, shrinking the grain considerably and lessening the yield.

Two fields were summer-fallowed, costing \$6.66 and \$7.17 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow	7 bu.	\$1.66 per bu.	\$2.06 per bu.
Wheat after wheat	Green feed.		
Wheat after fallow.....	11 bu.	\$1.04	1.33
Oats after wheat, seeded.....	43½ bu.	.26	.30
Alfalfa.....	ton.	6.45 per ton	7.36 per ton
Western rye grass.....	ton.	6.02	6.93
Oats after corn and wheat	56 bu.	.19 per bu.	.22 per bu.

Maple Creek.—Operator, G. L. Hammond. Seeding commenced early. The seed-bed was in good condition and the soil had a fair share of moisture. Wheat sown April 9 was harvested July 31. Oats sown May 13 were harvested August 16. Continuous dry weather, along with high winds during the growing season, lessened the yield per acre. Good cultivation and good seed have shown their value in this section.

Two fields were summer-fallowed, one costing \$6.26 per acre, the other \$6.17 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow.....	10 bu.	\$1.15 per bu.	\$1.45 per bu.
Wheat after wheat	1 "	.64 "	.84 "
Wheat after fallow, seeded with rye grass.....	10 "	1.17 ½ "	1.49 "
Oats after wheat	8 "	1.22 "	1.45 "
Alfalfa grown for seed	33½ lbs.	10c. per lb.	22c. per lb.
Wheat after corn	2 bu.	3.68 per bu.	5.31 per bu.

Meota.—Operator, Walter Tait. The season opened up for seeding April 26. The soil, having been summer-fallowed in 1917, was in a good state of cultivation. There was a good supply of moisture in the soil and the grain germinated readily. Exceptionally dry weather set in and there was a severe frost July 24, causing a complete failure of the crop.

Moosejaw.—Operator, J. J. Glassford. The spring of 1918 opened earlier than in 1917. There was a good supply of moisture and the soil was in good tilth. The rainfall up to about July was light. However, with good seed and good cultivation, fairly good crops were harvested. Wheat sown April 10, was harvested August 28. Oats sown May 7 were harvested August 3.

Two fields were summer-fallowed, one costing \$8.63 per acre and the other \$7.46 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow.....	22 bu.	55c. per bu.	66c. per bu.
Wheat after fallow	26 "	47c. "	57c. "
Oats after wheat, seeded	No crop.		
Alfalfa	"		
Western rye grass	"		
Oats after wheat and corn	32 bu.	27c. per bu.	44c. per bu.

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Madison.—Operator, F. E. Halpenny. The season opened up three weeks earlier than in 1917. There was a good supply of moisture in the lower soil. The grain on this account had to be sown a little deeper than usual. There was good growth until the moisture was exhausted. Exceptionally dry weather set in from the time the grain was planted and lasted until harvest time, making crops almost a failure. There was a heavy frost July 24, which did considerable damage, particularly to the late growing grain. Wheat sown April 23 was harvested August 31 and oats sown April 25 was harvested August 24.

Two fields were summer-fallowed, one costing \$6.81 per acre, the other \$6.52 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after wheat.	1 bu. 48 lbs.	\$4.06 per bu.	\$5.26 per bu.
Wheat after fallow.	11 bu. 12 lbs.	1.05 "	1.28 "
Wheat after fallow	12 bu. 48 lbs.	1.02 "	1.13 "
Oats after wheat.	6 bu. 24 lbs.	1.15 "	1.43 "
Alfalfa	$\frac{1}{2}$ ton.	11.41 per ton.	13.62 per ton.
Oats after wheat.	8 bu.	0.74 per bu.	0.91 per bu.

Pambrun.—Operator, C. W. Appelgren. The season of 1918 opened earlier than usual. There was a fair supply of moisture in the soil. Seed sown germinated well and made good growth until the store of moisture was exhausted. The rain-fall throughout the growing season was exceptionally light and as a result crops were almost a failure. Wheat sown April 10 was harvested August 10 and oats sown April 26 were harvested August 9.

Three fields were summer-fallowed, costing per acre \$6.87, \$5.68 and \$6.92, respectively.

	Yield per acre.	Standard Cost.	Actual Cost.
Oats after fallow	18 bu.	76c. per bu.	85c. per bu.
Wheat after fallow	No crop.		
Wheat after wheat.	"		
Wheat, seeded rye grass.	10 bu.	\$1.20	\$1.39
Hay	No crop.		
Corn after wheat.	"		
Wheat after corn.	"		

Prelate.—Operator, W. Huxtable. The season of 1918 opened up for seeding April 27. The soil was moist and in good tilth. The seed germinated readily, but, owing to the very high winds and continuous dry weather, very little growth was made. The summer-fallowed fields show the value of extra cultivation. Two fields were in summer-fallow in 1918, costing \$4.98 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow.	7 bush.	\$1.40 per bush.	\$1.66 per bush.
Wheat after wheat.	3 "	2.33 "	2.81 "
Wheat after fallow.	6 "	1.64 "	1.95 "
Oats after wheat.	No crop.		
Alfalfa	$\frac{1}{4}$ ton.	12.64 per ton	13.84 per ton.
Western rye grass	$\frac{3}{4}$ "	4.60 "	5.18 "
Oats after wheat and corn.	$\frac{1}{2}$ ton for feed.	24.20 "	31.70 "

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Radville.—Operator, Ernest Noble. Seeding began the first week in May. The soil was in good tilth and had a good supply of moisture. Wheat sown May 2 was harvested August 27. Oats sown May 14 were harvested August 19. Dry weather prevailed during the growing season. The value of conserving moisture is here shown by good cultivation and summer-fallow.

Two fields were summer-fallowed, costing \$7.44 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow.....	20 bush.	68 cts. per bush.	82 cts. per bush.
Wheat after wheat.....	13 "	87 "	1.68 "
Wheat after fallow.....	19 1/2 "	71 "	82 cts. "
Oats after wheat, seeded with rye grass.....	37 "	33 "	41 "
Oats cut green.....	1/2 ton.	\$14.13 per ton.	\$30.03 per ton.
Western rye grass.....	1 "	7.89 "	8.69 "
Oats cut green.....	4/5 "	8.71 "	12.13 "

Shaunavon.—Operator, Neil McLean. The season of 1918 opened up early. There was plenty of moisture and soil conditions were favourable for growth. During the growing season the rainfall was very light and as a result yields were low. There is quite a noticeable difference in yields on fallowed lands and on lands where wheat was grown after wheat.

Two fields were summer-fallowed in 1918, costing \$6.85 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow.....	15 bush.	\$0.83 per bush.	\$0.99 per bush.
Wheat after wheat.....	5 "	1.94 "	2.59 "
Wheat after fallow, seeded with rye grass.....	17 "	0.76 "	0.90 "
Oats after wheat.....	15 "	0.58 "	0.72 "
Alfalfa and western rye grass.....	2/3 ton.	8.55 "	10.02 "
Wheat after corn.....	15 bush.	0.71 "	0.87 "

Weyburn.—Operator, E. Meredith. The season of 1918 opened up earlier than in 1917. The soil was in excellent tilth and had a good supply of moisture. Grain sown germinated well and made good steady growth. Wheat sown April 13 was harvested August 21. Oats sown May 14 were harvested August 27. Although dry weather prevailed during the growing season, the value of good cultivation and good seed is marked.

Two fields were summer-fallowed, costing \$7.01 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after fallow.....	25 bush.	\$0.45 per bush.	\$0.56 per bush.
Wheat after wheat.....	20 "	0.62 "	0.74 "
Wheat after fallow.....	28 "	0.48 "	0.57 "
Oats seeded with rye grass.....	80 "	0.17 "	0.19 "
Oats after alfalfa.....	20 "	0.36 "	0.47 "
Western rye grass.....	1/2 ton.	8.14 per ton.	8.34 per ton.
Oats after corn and wheat.....	80 bush.	0.07 per bush.	0.18 per bush.

Tugaske.—Operator, R. Wilson. The farm at this point on which the Illustration fields are located is owned and operated by R. Wilson. The farm adjoins the town and is situated on one of the leading roads. The soil is clay loam and represents a large area. This land had been previously cropped and was summer-fallowed in 1918. to be cropped as directed in 1919.

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Zealandia.—Operator, W. M. Roberts. The farm at this point on which the Illustration fields are located is owned and operated by Mr. W. M. Roberts. It adjoins the town of Zealandia, on the main road leading to Rosetown. The area selected in the autumn of 1917 had been previously cropped and all was summer-fallowed in the season of 1918, to be cropped as directed in 1919.

ILLUSTRATION STATIONS IN ALBERTA.

Bassano.—Operator, R. H. Jones. The farm at this point on which the Illustration fields are located is owned and operated by Mr. R. H. Jones, and is situated on Section 9, Tp. 21, R. 18, W of 4. M. The soil is heavy loam cropped a number of years. It was fallowed in 1917, to be cropped as directed in 1918.

Bow Island.—Operator, M. Mortensen. The season opened up ten days earlier than in 1917, with only a fair supply of moisture in the soil. The grain was sown April 22 on a well prepared seed bed and germinated readily but made very little growth from May, throughout the season. It will be noticed that no crops were harvested except on land summer-fallowed the previous year. Five fields were summer-fallowed, costing per acre \$5.91, \$6.02, \$6.59, \$5.56 and \$7.61, respectively.

	Yield per acre.	Standard Cost.	Actual Cost.
Wheat after wheat	No crop.		
Wheat after fallow.....	4 bush., 48 lbs.	\$1.77 per bush.	\$2.17 per bush.
Wheat after fallow.....	3 bush., 12 lbs.	2 44	2 89
Oats after wheat.....	No crop.		
Oats after corn and wheat..	No crop.		

Carmanagay.—Operator, W. H. Miller. Owing to changing the location of the Illustration Station at this point, it was found necessary to summer-fallow most of the land to be cropped in 1919. The cost of summer-fallow was \$7.79 per acre.

Delacour.—Operator G. M. McElroy. The farm at this point on which the Illustration fields are located is owned and operated by G. M. McElroy and is situated on the north-west quarter of Section 24, Tp. 25, R. 28, W of 4 M., at the junction of two roads and quite close to the Grand Trunk Pacific Railway. The area selected had been cropped several years. In order to have uniformity it was summer-fallowed in 1918, to be cropped as directed in 1919. The cost of summer-fallow was \$5.60 per acre.

Foremost.—Operator, T. H. Frankish. Seeding commenced April 15, which was about one week earlier than the previous year. The soil and climatic conditions were ideal. Unfortunately, following this date, there was very little rain-fall, causing almost no growth.

Two fields were in summer-fallow, costing \$7.57 per acre.

	Yield per acre.	Standard cost.	Actual cost.
Wheat after wheat	No crop.		
Wheat after fallow.....	7½ bush.	\$1.50 per bush.	\$1.81 per bush.
Wheat after fallow	7½ "	1.16	1.40
Oats after wheat..	No crop.		
Western rye grass	"		
Alfalfa.....	"		
Wheat after corn and wheat	"		

Grassy Lake.—Operator, J. E. James. On April 13, soil and weather conditions were ideal for seeding. Wheat and oats germinated readily, making good growth

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until June 15, when dry weather set in, almost completely destroying the crop.
Three fields were summer-fallowed, costing \$7.46, \$6.24 and \$6.24, respectively.

	Yield per acre.	Standard cost.	Actual cost.
Wheat after fallow.....	11 bush.	\$1.17 per bush.	\$1.33 per bush.
Wheat after wheat.....	No crop.		
Wheat after fallow.....	9 bush.	1.24	1.44
Oats after fallow.....	No crop.		
Oats after wheat at 1 ton.....	"		

High River.—Operator, B. F. Kiser. The spring opened about a week earlier than usual in this district. Soil and climatic conditions were ideal for spring growth. Wheat sown April 11 was ripe August 28. Oats sown May 2 were ripe September 4. The season throughout was very favourable for all kinds of crops.
Two fields were in summer-fallow, costing \$6.50 and \$5.52 per acre, respectively.

	Yield per acre.	Standard cost.	Actual cost.
Wheat after fallow.....	28 bush.	\$0.58 per bush.	\$0.66 per bush.
Wheat after wheat.....	16 "	0.59 "	0.76 "
Oats after wheat.....	18 "	0.46 "	0.59 "
Wheat after fallow.....	21 "	0.50 "	0.60 "
Alfalfa.....	$\frac{1}{2}$ ton.	11.01 per ton.	14.68 per ton.
Western rye grass.....	$\frac{1}{2}$ "	7.34 "	9.78 "
Oats after fallow.....	15 bush.	0.34 per bush.	0.37 per bush.

Jenner.—Operator, Jerry Fisher. The season of 1918 opened up about 10 days earlier than in 1917, with plenty of moisture in the soil. Wheat germinated readily and made a good growth up to about June. Then owing to the extreme drought and heat, all kinds of crops ceased growing, thus causing almost a failure. Wheat sown April 18, was harvested August 16 and oats sown April 25 were harvested August 26.

	Yield per acre.	Standard cost.	Actual cost.
Wheat after wheat.....	1 bush	\$7.61 per bush.	\$10.20 per bush.
Wheat after fallow.....	5 " 28 lbs.	1.56 "	2.05 "
Wheat on fallow.....	4 " 24 "	1.90 "	2.35 "
Oats on fallow.....	3 " 20 "	2.06 "	2.66 "

Macleod.—Operator, Norman Grier. Spring seeding began about the usual time. The soil and seed-bed were in excellent condition for sowing. The grain germinated readily and notwithstanding the dry season, fair crops were harvested. It is here interesting to note the difference in the yield per acre and the cost per bushel between wheat grown on fallowed land and that grown on land which had previously been in wheat.
Three fields were summer-fallowed, costing \$5.15, \$5.06 and \$4.74 per acre, respectively.

	Yield per acre.	Standard cost.	Actual cost.
Wheat on fallow.....	16 bush. 24lb	\$ 0.76 per bush	\$ 0.87 per bush
Wheat after wheat.....	5 "	1.50 "	1.93 "
Oats after oats.....	10 "	0.69 "	0.84 "
Wheat after fallow.....	11 "	0.79 "	0.96 "
Alfalfa.....	$\frac{1}{2}$ ton.	11.68 per ton.	14.38 per ton.
Western rye grass.....	Not cut.		

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Magrath.—Operator, J. A. Meldrum. The season of 1918 was dry, although there was plenty of moisture to germinate the seed, which made good growth up to about June. The continuous dry weather retarded growth from that time and a light crop of wheat was harvested. Oats made a very weak growth and in some cases were not harvested. It was noticeable that the crops in the district of Magrath, as well as in the districts of Milk River and Foremost, where illustration stations are located, were better than those between these points.

Three fields were summer-fallowed, two costing \$5.15 per acre and the third \$5.75 per acre.

	Yield per acre	Standard cost.	Actual cost.
Wheat after wheat	No crop		
Wheat after fallow.....	15 bush. 20 lb.	\$1.66 per bush	\$1.96 per bush
Wheat after fallow.....	11 " 12 lb.	5 35	7.54
Oats after wheat.....	No crop		
Oats after wheat and corn.....			
Oats after hay and corn.			

Milk River.—Operator, B. L. Cornwall. Seeding began two weeks earlier than in 1917. The soil was in good condition. Seed germinated rapidly and made good growth up to about June 10. The soil was then almost exhausted of moisture and there was no rainfall, which condition caused very little further growth.

The rotations at this Station are being changed and will be in order in 1919. There were two summer-fallowed fields costing \$6.50 per acre. It is noticeable here that well cultivated summer-fallow produced crops while grain sown after grain did not produce a crop.

	Yield per acre.	Standard cost.	Actual cost.
Wheat after fallow..	7 bush.	\$1.66 per bush	\$1.96 per bush
Wheat after wheat	1 " 20 lb.	5 35	7.54
Oats after wheat....	No crop		
Wheat after fallow	8 bush.	1 03	1 28
Alfalfa	No crop		
Western rye grass.....			

Munson.—Operator, R. R. Fraser. Seeding began about April 20. The soil was in perfect condition and germination was rapid. The grain made a good growth, regardless of continuous dry weather, and was ripe August 22, the quality of the seed being very good. Two fields were summer-fallowed, one costing \$6.28 per acre and the other \$6.30 per acre.

	Yield per acre.	Standard cost.	Actual cost.
Wheat after wheat	8 bush.	\$ 1.07 per bush.	\$ 1.51 per bush
Wheat after fallow.....	26 " "	0.55 "	0.63 "
Alfalfa	1/2 ton.	18.22 per ton	20.72 per ton
Western rye grass....			
Oats after fallow.....	8 bush.	0.90 per bush.	1.14 per bush
Wheat after fallow.....	25 "	0.40 "	0.40 "
Oats after wheat and corn.....	40 "	0.17 "	0.27 "

Pincher Creek.—Operator, Sandgren and Carlson. Soil and weather conditions were ideal in this locality and spring opened up about the usual time. Crops made

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good growth until about June 15, when dry weather set in, materially lessening the yield per acre. Wheat sown April 12 was harvested August 24. Oats sown May 8 were harvested August 28.

There were two fields summer-fallowed in this rotation, one costing \$7.90 per acre and the other \$8.43 per acre.

	Yield per acre.	Standard cost.	Actual cost.
Wheat after fallow.....	15 bush. 24 lb.	\$ 0.96 per bush	\$ 1.16 per bush
Wheat after wheat.....	3 " "	2 " "	4.37 " "
Oats after oats.....	No crop		
Wheat after fallow.....	20 bush. 48 lb.	0.55 " "	0.69 " "
Alfalfa.....	1,333 lb.	10.19 per ton	12.77 per ton.
Western rye grass.....	No crop		
Oats after wheat and corn.....	18 bush.	0.51 per bush	0.68 per bush

Taber.—Operator, I. L. Holman. Seeding commenced April 13. The grain germinated readily but owing to the lack of moisture in the soil and to the very light rainfall, scarcely any crop was harvested. Three fields were in summer-fallow, two costing \$6.40 per acre and the third \$5.82 per acre.

	Yield per acre.	Standard Cost.	Actual Cost.
Oats on fallow.....	No crop.		
Wheat on fallow.....	1 bush. 24 lbs.	\$7.52 per bush.	\$8.83 per bush.
Wheat on fallow.....	1 bush. 24 lbs.	7.52 " "	8.83 " "
Wheat on fallow.....	No crop.		
Oats on fallow.....	No crop.		

Whitla.—Operator, R. H. Babe. Weather and soil were ideal for seeding and the grain germinated well, making good growth until June 15, when dry weather set in, almost completely destroying the crop.

Two fields were summer-fallowed, costing \$7.10 per acre and \$8.65 per acre, respectively.

	Yield per acre.	Standard Cost	Actual Cost.
Wheat after fallow.....	5 bush.	\$2.88	\$3.12
Wheat after wheat.....	No crop.		
Oats after wheat.....	No crop.		
Wheat after fallow.....	7 bush.	\$1.62	\$1.93
Alfalfa.....	No crop.		
Western rye grass.....	No crop.		
Wheat after corn and wheat.....	No crop.		

Wainwright.—Operator, G. C. Boyd. The farm at this point on which the illustration fields are located is owned and operated by Mr. G. C. Boyd, and is situated on the NW. $\frac{1}{4}$ sec. 8, tp. 45, rge. 6 W of 4 M., 1 mile north of the town of Wainwright. The soil is a chocolate loam, typical of a large area. This land had been cropped previous to 1917 and was summer-fallowed during the season of 1917, to be cropped as directed in 1918.

Youngstown.—Operator, G. S. Coad. The farm selected for illustration work is owned and operated by Mr. G. S. Coad and is situated in the SW. $\frac{1}{4}$ sec. 27, tp. 29, rge. 9, W of 4 M., 1 mile south of Youngstown. One of the leading roads adjoins this location. The soil is chocolate loam with many burn-out holes, typical of a large area.

This station is to be cropped in the regular rotations in 1919. It was summer-fallowed this season at a cost of \$7.71 per acre.

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ILLUSTRATION STATIONS IN QUEBEC.

Aubrey, Chateauguay County.—Operator, Samuel Reddick. Four-year rotation.

Field A—Banner oats. Yielded 53 bushels 13 pounds per acre; actual cost being 20 $\frac{3}{4}$ cents per bushel, and standard cost 20 $\frac{1}{2}$ cents per bushel; straw valued at \$6 per ton.

Field B—Clover. First crop yielded 2 tons 300 pounds per acre; actual cost being \$6.75 per ton, standard cost \$6.25 per ton.

Field C—Corn. Estimated yield 10 tons per acre; actual cost \$3.09 per ton, standard cost \$3.04 per ton.

Field D—Clover hay. First crop yielded 1 ton 1,320 pounds per acre; actual cost being \$8.60 per ton and standard cost \$8 per ton. Second crop from the same field yielded 4 tons of fodder. This crop was threshed and yielded 40 lbs. seed per acre, actual cost being \$34.50 and standard cost \$31.75. Part of field D in Timothy yielded 1,756 pounds of fodder per acre, which was threshed, yielding 231 pounds of seed, actual cost being 2 $\frac{1}{2}$ cents per pound, standard cost 2 $\frac{3}{4}$ cents. Actual cost of manual labour was 20 cents per hour and for horse labour 7 $\frac{1}{2}$ cents per hour.

Lachute, Argenteuil County.—Operator, S. E. Smith. Four-year rotation.

Field A—Banner oats. Yielded 42 bushels 28 pounds per acre; actual cost being 27 $\frac{3}{4}$ cents per bushel and standard cost 25 $\frac{1}{4}$ cents per bushel.

Field B—Corn. Estimated yield 8 tons 1,600 pounds per acre; actual cost being \$2.99 per ton, standard cost \$2.61 per ton.

Field C—Clover hay. First cut yielded 1 ton 400 pounds per acre. Second cutting yielded 5 tons. The second cut was threshed and gave a yield of 67 pounds of seed per acre, at an actual cost of \$79.60.

Field D—Clover hay. First cutting yielded an average of 1 ton per acre. The second cutting of the same year yielded 5 tons fodder and the second cutting was threshed and gave a yield of 67 pounds of seed per acre. The total actual cost per acre \$16.36. Cost of manual labour was 21 $\frac{1}{2}$ cents per hour and cost of horse labour 10 cents per hour.

New Carlisle, Bonaventure County.—Operator, E. M. Lagallais. Four-year rotation.

Field A—Banner oats. Yielded 53 bushels per acre at an actual cost of 21 $\frac{3}{4}$ cents per bushel and a standard cost of 24 $\frac{1}{4}$ cents per bushel.

Field B—Potatoes. Yielded 211 bushels per acre at an actual cost of 17 $\frac{3}{4}$ cents per bushel and a standard cost of 19 $\frac{1}{4}$ cents per bushel.

Fields C and D—Hay. Yielded 1 ton 1,000 pounds per acre at an actual cost of \$7.95 per ton and a standard cost of \$8.26 per ton.

The actual cost of manual labour was 16 $\frac{1}{2}$ cents per hour, and of horse labour 5 cents per hour.

Stanbridge East.—Operator, C. S. Moore. Four-year rotation.

Field A—Swedes. Yielded 20 tons 1,000 pounds per acre at an actual cost per ton of \$3.09 and a standard cost of \$2.83.

Field B—Hay, mixed. Yielded 1 ton 1,200 pounds per acre, at an actual cost of \$7.50 per ton and a standard cost of \$7.35 per ton.

Field C—Clover hay. Two crops yielded 2 tons 1,400 pounds; actual cost being \$5.29 per ton and standard cost \$5.09 per ton.

Field D—Banner oats. Yielded 55 bushels 20 pounds per acre; straw estimated at 1,300 pounds per acre; actual cost being 36 $\frac{3}{4}$ cents per bushel and standard cost 33 $\frac{1}{4}$ cents per bushel.

Four-year rotation being started on adjoining undrained land.

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Fields E, F, G—Sown to Banner oats. Yielded 21 bushels 11 pounds per acre; straw estimated at 1,300 pounds per acre; actual cost being $74\frac{3}{4}$ cents per bushel, and standard cost 65 cents per bushel.

Field H—Corn. Estimated 10 tons per acre; actual cost being \$3.81 per ton, standard cost \$3.18 per ton.

Actual cost of manual labour was 18 cents per hour, and of horse labour 15 cents per hour.

Drummondville, Drummond County.—Operator: Emile Marier. Four-year rotation.

Field A—Corn sown on this field was a failure, owing to continuous wet weather. Land had to be re-sown with oats for green feed.

Field B—Banner oats. Yielded 56 bushels 9 pounds per acre, at an actual cost of 16 cents per bushel and a standard cost of $17\frac{3}{4}$ cents per bushel; straw valued at \$6 per ton.

Field C—Timothy and clover. First cutting estimated at 1 ton 900 pounds per acre. The second cutting of the same season estimated at 363 pounds per acre, from which was threshed 25 pounds of seed per acre. Total actual cost per acre of this field was \$10.06; the standard cost was \$10.33 per acre. The actual cost of the seed was $8\frac{1}{2}$ cents per pound and the standard cost 10 cents per pound.

Field D—Clover hay. First cutting yielded 1 ton per acre. The second cutting yielded 1,000 pounds per acre, which was threshed, giving a yield of 76 pounds of seed per acre. The actual cost of both crops was \$12.15 per acre, the standard cost \$12.51 per acre.

Lac à la Tortue, Champlain County.—Operator, S. T. Lupien. Four-year rotation.

Field A—Clover hay. Yielded 1,950 pounds per acre, at an actual cost of \$12.44 per ton and a standard cost of \$11.82 per ton. The second crop was left on the field as a fertilizer.

Field B—Corn. Estimated yield 10 tons per acre at an actual cost of \$2.63 per ton and a standard cost of \$2.12 per ton.

Field C—Spring rye. Yielded 15 bushels per acre; straw yielded 1,500 pounds per acre; actual cost being 96 cents per bushel and standard cost 79 cents per bushel.

Field D—Mixer hay. Yielded 600 pounds per acre. The soil on this field is exceptionally poor, not having been manured for many years. Corn is to be sown on this field in 1919 and it is to be manured.

The soil at this station is very light sand, depleted of plant food. However, good progress is being made. It will be noted that field A yielded 1,950 pounds of hay per acre and field D only 600 pounds per acre. It is expected that when the rotation has been twice repeated heavy crops will be harvested.

Rimouski, Rimouski County.—Operator, Nazaire Begin. Three-year rotation:—

Field A.—Banner oats. Yielded 58 bushels, 8 pounds per acre, actual cost being 26 cents per bushel and standard cost 20 cents per bushel.

Field B.—Clover hay. Estimated yield, 1 ton, 750 pounds per acre, actual cost being \$10 per ton, standard cost \$9.50 per ton.

Field C.—Potatoes. Yielded 314 bushels per acre, actual cost being $21\frac{1}{4}$ cents per bushel and standard cost 17 cents per bushel.

Four-year rotation:—

Field A.—Clover hay. Estimated yield, 1,875 pounds, actual cost being \$12.21 per ton and standard cost \$11.27 per ton.

Field B.—Banner oats. Yielded 62 bushels 3 pounds per acre, actual cost being 35 cents per bushel and standard cost $25\frac{1}{2}$ cents per bushel.

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Field C.—Corn and roots. Not reported, almost a failure, on account of wet land, which should be tile-drained.

Field D.—Clover hay. Estimated yield, 1,875 pounds per acre, actual cost being \$12.43 per ton and standard cost \$11.27 per ton. Both clover fields were cut early. No record is given of the second crop.

Actual cost of manual labour was 31½ cents per hour, and of horse labour 10½ cents per hour.

Ste. Julie, Verchères County.—Operator, Adophe Hebert. Four-year rotation:—

Field A.—Corn. Estimated yield, 10 tons per acre, at an actual cost per ton of \$1.75 and a standard cost of \$1.93 per ton.

Field B.—Timothy grown for seed yielded 120 pounds per acre, and 1,600 pounds of fodder, at an actual cost of 3¾ cents per pound and a standard cost of 4 cents per pound.

Field C.—Banner oats. Yielded 65 bushels 20 pounds per acre, at an actual cost of 23¾ cents per bushel and a standard cost of 26½ cents per bushel, straw valued at \$6 per ton.

Field D.—Clover. First crop yielded 1 ton 1,000 pounds per acre at an actual cost of \$9.61 per ton, and a standard cost of \$10.49 per ton.

Field D.—Clover. Second crop saved for seed. Yield 68 pounds per acre for seed; fodder, 700 pounds per acre, at an actual cost of \$14.99 per acre and a standard cost of \$14.11 per acre. The actual cost of manual labour was 15 cents per hour, and the cost of horse labour 7½ cents per hour.

St. Gédéon, Chicoutimi County.—Operator, Wilfred Simard. Three-year rotation.

Field A.—Clover hay. Yielded 2 tons 500 pounds per acre, at an actual cost per ton of \$6.76 and a standard cost of \$6.70.

Field B.—Marquis wheat. Yielded 26 bushels 18 pounds per acre, at an actual cost of 62 cents per bushel and a standard cost of 62 cents per bushel.

Field C.—Potatoes. Yielded 234 bushels per acre, at an actual cost of 21½ cents per bushel and a standard cost of 19½ cents per bushel.

Four-year rotation:—

Field A.—Clover hay yielded 2 tons 500 pounds per acre, at an actual cost of \$5.75 and a standard cost of \$5.68 per ton.

Field B.—Swedes and mangels. Yielded 20 tons per acre, at an actual cost of \$1.95 per ton and a standard cost of \$1.87 per ton.

Field C.—Hay. Estimated yield, 1 ton 500 pounds per acre, at an actual cost of \$9.14 per ton and a standard cost of \$9.08 per ton.

Field D.—Banner oats. Yielded 61 bushels 15 pounds per acre, at an actual cost of 14¾ cents per bushel and a standard cost of 14¾ cents per bushel.

The actual cost of manual labour was 23 cents per hour, and for horse labour 4½ cents per hour.

DIVISION OF EXTENSION AND PUBLICITY.

REPORT OF THE OFFICER IN CHARGE, W. A. LANG.

The work of the division during the past year may briefly be stated to have been attending fairs, exhibitions, etc., issuing and distributing exhibition circulars and enlarging the mailing list.

It was found more and more difficult, as the war progressed, to find the men to carry on exhibition work and in the case of five of our branch Farms no work of this

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nature could be undertaken, for unless competent and well-qualified attendants are available for this work it is better left undone; while in nearly all cases the remaining branch Farms were compelled to curtail the work. Last year, 117 fairs were attended by the branch Farms, while this season only 39 were reached, and 29 fairs were attended from the Central Farm as against 56 this season, 146 as against 95. When conditions become normal and the men are all returned from overseas, there is no reason to doubt that the branch Farms will be able to secure the necessary assistants to cover at least 10 exhibitions each making an aggregate of 200 fairs.

It was decided to follow the plan adopted last year of covering the provincial fairs on the Prairie circuit with a general exhibit from the Central Farm and this exhibit was supplemented by exhibits from the branch Farm of the district in which the exhibition was held.

Many thousands of our exhibition circulars have been distributed during the year, both at the exhibitions and from the office. 15,580 names have been added to the mailing List, of which 11,670 were English and 3,910 French.

Judging by the number of requests we get for the Experimental Farm exhibit and from the very favourable reception given when an exhibit is sent, we feel that it is fair to draw the conclusion that the Farms' exhibition work is appreciated, not only by the fair officials but by the farmers as well.

Owing to the great number of exhibitions held in the Dominion in a comparatively short season, it must happen that dates will clash, that many fairs will be going on on the same date, for instance this year 19 fairs were held in the province of Ontario on the same dates. It therefore follows that in order to reach all the exhibitions (and we feel that the small fair has the same call on the department as the large one) more exhibits must be sent out each year, not only from the Central Farm, but also from some of the branch Farms.

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

REPORT OF THE SUPERINTENDENT, J. A. CLARK, B.S.A.

THE SEASON.

An early spring followed a long, cold winter. The snow disappeared from the fields early in April. A continuous covering of snow had remained on the fields throughout the winter, which not only admirably protected the hay fields, but prevented a deep penetration of frost. Bright, warm days with drying winds during April dried up the fields rapidly and enabled farmers to work up and seed considerable areas of the drier land toward the close of the month. Ideal weather conditions throughout May enabled the farmers to put in their crops rapidly and well. Practically all grain, potatoes and a large percentage of the root crops were planted during the month.

Taken generally, the season of 1918 was not entirely satisfactory for the maximum yields of all classes of farm crops. The yields of all classes of fruit were very light; the very severe winter weather left the fruit buds in a weakened condition, which, when called upon to resist the frosts that occurred on the 20th and 21st of June, were unable to do so, and consequently dropped shortly afterward. Severe frosts in June and again in September caused considerable losses in tender crops such as tomatoes, corn and beans. Continued cold weather, with but little precipitation during the months of May and June resulted in what gave promise of a maximum hay crop yielding slightly below an average crop. Frequent showers during July and early August greatly retarded haymaking, and also injured the quality of some of the heavier cuts. These showers that were detrimental to the hay crop, were admirably

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suited to the grain crops, which yielded abnormally throughout the province. In spite of continuous inclement weather during harvest, the majority of the grain and fodder crops were saved in good condition. Potatoes suffered severely from Late Blight in unsprayed districts, which, combined with the wet, humid weather, resulted in serious losses from rot. The frosts in June and September, in conjunction with cool weather throughout the summer, were responsible for the poorest crops of corn, tomatoes, beans, as well as many garden crops, that have been grown for years. Roots yielded below the average, but were of good quality, and exceedingly free from disease. Mild, open weather during the greater part of November, enabled the farmers to complete successfully the gathering of their crops, as well as to finish up their fall ploughing. The "freeze up" of the winter came on November 26. Snow sufficient for sleighing fell early in December, and remained on the ground throughout the winter. The winter has been exceptionally mild, without severe storms, and further marked by the absence of heavy thaws.

METEOROLOGICAL RECORDS.

Months.	Temperature Fahrenheit.					Precipitation.					Bright Sun- shine. Hours.
	Maximum.		Minimum.		Mean.	Rainfall.		Snowfall.		Total.	
	Date.	Degree	Date.	Degree.		Degree.	Days.	Inches.	Days.			Inches.	Inches.
April...	29	62	8	12	55.460	6	8.3	2	5	8.9	183
May	19	79	5	28	50.37	8	1.84			1.84	234.2
June	3	79	20	57	58.816	8	3.25			3.25	245.7
July.....	23-27-30	81	9 & 25	56	65.032	13	4.53			4.53	181.9
August.....	24	82	19	42	62.161	9	1.37			1.37	254.1
September	6 & 15	78	12	72	75.74	15	5.60			5.60	153.1
October	13	65	20	28	47.61	17	5.51			5.51	108.1
November	1	63	26	12	35.93	12	2.87	4	6.5	3.52	62.6
December...	15	47	8	5	25.016	5	2.11	13	31.5	5.26	49.7
1919.											
January	2	44	12	-13	21.177	6	1.65	8	14.5	3.10	70.1
February....	16-19-24	55	10-23-28	5	22.856	1	1.5	13	23.25	2.475	99.1
March.....	10 & 28	43	14	4	27.61	11	3.15	1	1	3.25	129.2
Totals for year.. .. .						109	32.89	41	79.75	40.595	1,771.6

LIVE STOCK.

Horses.

The draft horses at this station consisted, at the close of the year, of two pure-bred Clydesdales mares, one grade mare, one grade gelding, one grade gelding rising three years old, and one pure-bred filly rising two years old. In addition to these, there are one express horse and one driving mare. The loss of one horse from an unknown cause, and another from colic during the year, necessitated the hiring of extra horses during the busy seasons.

Dairy Cattle.

The pure-bred Ayrshire heifer, "Lily Helen" No. 53710, dropped a bull calf on June 29. This heifer has produced 4,370.7 pounds of milk up to March 31, and gives promise of being a high producing animal. A yearling pure-bred Ayrshire bull "Duke of Ravenwood" as well as the bull calf mentioned above, were sold during the year. A seven-eighths Ayrshire grade cow was purchased to augment the supply of milk at this station at the beginning of the winter. "Ottawa Ivanhoe", a very promising young Ayrshire bull of excellent breeding was received, late in March, from the Central Experimental Farm, Ottawa, for breeding purposes in this province.

Beef Cattle.

Twenty-eight grade steers, ranging from two and one-half to three years old, and mostly of a good thrifty, typical Shorthorn appearance, were purchased from local drovers during the latter part of October. They were dehorned and allowed to run on pasture, supplemented by corn stover, turnip and mangel tops, until November 13, when they were brought in, weighed and divided into seven pens of four steers each.

The special feature of our work with fattening steers, from November 15, 1918, to March 15, 1919, was the conducting of feeding tests that would be practicable to the general farming community of Prince Edward Island, and thereby secure reliable information which would be of service to farmers who wished to undertake work of this nature. For this reason greater stress was put upon home-grown grains, fed separately, mixed and in combination with commercial feeding concentrates. In addition to these experiments, tests were conducted whereby the feeding value of dried blood meal, which is manufactured at one of our local abattoirs, could be ascertained. The results obtained, although not conclusive, would tend to show that a mixture of ground oats and barley, equal parts by weight, is cheaper, is as profitable and as satisfactory as feeding them separately in combination with the commercial feeding concentrates, such as oil cake meal, cotton seed meal, 36 per cent protein, or shorts. From the three tests conducted during the past winter with dried blood meal, the results obtained indicate that it is not a profitable feed for fattening steers. The following gives a statement of the expenditure:—

Purchase price of 28 steers, 23,255 pounds at 8½ cents.. . . .	\$2,034 81
Total cost of feed from November 15 to March 15, 1919.. . . .	970 48
Total expenditure.. . . .	\$3,005 29
Selling price, 30,025 pounds at 14·87 cents per pound.. . . .	4,467 23
Profit.. . . .	\$1,394 86
Average weight per steer after a 16-hour fast.. . . .	1,072 pounds.
“ “ “ “ when purchased... . . .	830·5 “
Gain per steer	241·5 “

Swine.

Six sows were purchased early in April. They consisted of one mature pure-bred Yorkshire sow and five young sows. The pure-bred sow gave a litter of eight pigs on May 28. The five young sows were bred, and three of them gave litters of eleven, nine and six pigs respectively, in August. The remaining sows proved undesirable, and were fattened and slaughtered. Four brood sows were bred in December and early January, and carried through the winter. These sows were housed during the winter in a portable hog cabin 8 feet by 10 feet, the frame of which was boarded in with one thickness of inch boards, and which was constructed for \$33.76; a yard was also provided for exercise.

The sows came through the winter in remarkably fine shape, being in that healthy and vigorous condition which is so essential in the breeding sow.

POULTRY.

The poultry plant was enlarged during the year by the erection of one permanent poultry house, 32 feet by 16 feet, divided into two equal pens by a wire mesh partition, each pen of which provides accommodation for fifty hens; and one 10 feet by 12 feet portable brooder house.

Two successful hatches were taken from our incubators in May and June, giving us 2,421 properly developed chickens. Eight hundred and eighty-five of these were

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sold as day-old chicks, 639 were reared to maturity at this station, and 869 succumbed to exposure, lack of brooder capacity, foxes, hawks, etc., throughout the summer. Out of the 639 chickens reared, 403 were sold for table use, 206 were selected from the entire flock for our winter laying pullets and breeding males, while the remaining 30 were sold for breeding purposes.

After the 1918 breeding season, the flock of some two hundred birds was carefully graded; all birds with a small egg production were classed with the undesirables and disposed of. The number of birds selected from the above flock to be carried over as breeding stock for 1919 consisted of 90 Single Combed White Leghorns and 33 Barred Rocks. The poultry wintered for egg production and for breeding purposes consisted of the following:—

	Pullets.	Hens.	Males.
Single Combed White Leghorns..	105	90	7
Barred Plymouth Rocks	91	32	6

As a means of stimulating an interest in better breeding and productiveness of poultry throughout Eastern Canada, and whereas Prince Edward Island was the most progressive Maritime Province in the poultry business, it was selected as the place to conduct the first "Egg Laying Contest" of the Dominion. This further augmented our poultry plant by the addition of ten 12 feet by 10 feet houses and 160 birds. Each house was divided into two equal pens by a wire mesh partition, and provided accommodation for two entries of eight birds each. Each pen was given an outdoor run 12 feet by 25 feet in area. The number of contestants from the different provinces was as follows: Prince Edward Island, 7; Nova Scotia, 5; Quebec, 1; New Brunswick, 3; Ontario, 1.

BEES.

The colony of Italian bees that was carried over the winter of 1917-18 dwindled and died early in the spring. A few pounds of Italian bees were sent from Ottawa, which increased rapidly and swarmed on August 13. Two fairly strong colonies were fed and put in wintering cases out-of-doors in November.

FIELD CROPS.

Averaging the different yields of the same crop on the various rotations conducted at this station, we find the average yield per acre to be as follows:—

Barley, one acre field of Charlottetown No. 80 yielded 52 bushels, 29 pounds.
 Clover hay, six fields of clover hay averaged 2 tons, 1,495 pounds.
 Timothy hay, five fields of timothy averaged 3 tons, 315 pounds.
 Mangels, three fields of mangels averaged 678 bushels per acre.
 Potatoes, two fields of potatoes averaged 299 bushels per acre.
 Oats, three fields of oats averaged 73 bushels 15 pounds.
 Wheat, four fields of wheat averaged 34 bushels 16 pounds.
 Turnips, nine plots of turnips averaged 820 bushels per acre.

ROOT SEED PRODUCTION.

The mangel and turnip stecklings that were grown and carried over the winter of 1917-18 for root seed production, were planted out early in May. Soon after planting, it was noticed that the vitality of the greater percentage of these was so low that they failed to start growing. From the ones that reached maturity, there were produced 1,483 pounds of mangel and 278 pounds of turnip seed.

Twenty acres were devoted to the raising of stecklings for root seed production in 1919. Equal areas of this acreage were planted late in June to turnips and mangels. The season was well suited to these crops, and they developed rapidly, and

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gave an excellent yield. They were harvested in good condition, in spite of the unfavourable weather, and stored partly in pits and partly in temporary cellars. Care was taken in the storage of these roots to have them dry and as free from earth as possible, which enabled us to keep the temperature during storage very uniform, ranging between 32° and 38° F. throughout the winter.

CEREALS.

Forty-one different varieties of wheat, oats and barley were tested in duplicate plots of one-sixtieth acre each, on an area that has been set aside for this purpose, and which is worked under a definite four-year rotation. This test included fourteen varieties of wheat, thirteen varieties of oats and fourteen varieties of barley. White-heads proved to be the most productive variety of wheat, yielding 65½ bushels per acre; Early Blossom was the most prolific variety of oats tested, yielding 103½ bushels per acre; and O.A.C. No. 21 led in the test of barleys, with a yield of 71½ bushels per acre. All of these grains were remarkably free from attacks of fungous diseases. The peas in the variety test of field peas were so badly damaged by the pea moth that no records were taken.

FORAGE CROPS.

Variety tests were conducted with a limited number of best commercial varieties of field roots. This work included a test of the following: five varieties of Swede turnips, led by Cornings Laplander, with a yield of 966½ bushels per acre; three varieties of mangels, led by Half Sugar White, with a yield of 612½ bushels per acre; six varieties of sugar beets, led by Russian, which yielded 570½ bushels per acre; and three varieties of field carrots, led by White Belgian, which yielded at the rate of 335½ bushels per acre. Four varieties of ensilage corn that was ripened at this station in 1917, were further tested in 1918; but severe frosts in late June and early September, in conjunction with unfavourable corn weather throughout the summer, resulted in the poorest crop of corn harvested in many years. Quebec Yellow reached the highest stage of maturity before being killed by frost.

An area of 1½ acres, which was devoted to the testing of various grasses and combinations of these for hay and pasture in 1917, gave good acreage yields; an equal area was seeded down to alfalfa in 1917, and only a fair catch of alfalfa was secured, resulting in a light crop in 1918.

HORTICULTURE.

Tree Fruits.

The orchards, wherein most of the leading commercial, as well as many of the newer, varieties of apples, cherries, pears and plums are being tested for hardiness and fruitfulness, yielded no fruit this season. The cherries blossomed and set a fair crop of fruit, which was destroyed by birds before it was ready for harvest. Apples, pears and plums blossomed sparingly, but set no fruit, which may be attributed to the fruit buds being in a weakened condition, due to the severe winter followed by heavy frosts late in June. Out of 111 varieties of apples, 43 varieties of plums and 22 varieties of pears, 13, 14 and 4 varieties respectively proved unsuited to our weather conditions during the year. The orchard was sprayed and kept free from attacks of insects and fungous diseases.

Small Fruits.

The work at this Station in connection with small fruits has been devoted entirely to a test of varieties. This test includes the following numbers of varieties of each class of fruit, namely: 30 of strawberries, 15 of red currants, 14 of black currants,

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5 of white currants, 8 of gooseberries and 7 of raspberries. The majority of these varieties seem well adapted to this climate. The yields from all classes of these fruits were very small.

Trees, Shrubs, Flowers and Lawns.

The ornamental trees and shrubs upon the lawns and along the driveways have developed well and give a very pleasing landscape effect. The former suffered severely from a heavy sleet storm followed by a high wind in January, which broke some of them badly. The majority of the latter have proved hardy. The flowers were very attractive; the weather conditions were particularly suited to their best development. The sweet peas were exceptionally good, while the dahlias and other flowers were above the average. The lawns were not so attractive as usual, owing to a large portion of the east lawn being planted to beans, buckwheat and clover, while a portion of the south lawn was planted to rape.

Vegetables.

Much of the experimental work with vegetables, including many of the variety tests, as well as much of the cultural work, was discontinued during the year, and the garden land utilized in vegetable and root seed production. Successful crops of spinach, radish and cabbage seed were produced. The tomatoes, beans, onions, squash and pumpkins were below the average, owing to the early frost and unfavourable weather conditions.

BUILDINGS.

The buildings erected at this Station during the year consisted of one permanent poultry house 32 feet by 16 feet, ten portable colony houses, (for Egg Laying Contest), 12 feet by 10 feet, one portable brooder house 10 feet by 12 feet, one portable hog cabin 10 feet by 8 feet, and two temporary root cellars, which were constructed for the storing of our steckling crop. In addition to these, the sheep barn was remodelled slightly, for experimental work with steers, while minor repairs were made on the other farm buildings.

EXHIBITIONS.

The only exhibition conducted in the province in 1919 was held at Charlottetown late in September. At this fair the Station erected a very pleasing and attractive exhibit of farm produce, as well as an interesting collection of models relating to farm buildings and practical devices. The display was augmented by exhibits put up by the Division of Extension and Publicity, Ottawa, and by the Plant Pathological Laboratory at Charlottetown. These combined exhibits were the feature of the fair. The attendance at this exhibition was comparatively small, due to bad weather, but the interest shown in all features of work carried on by the Station was good.

PICNICS, DEMONSTRATIONS AND AGRICULTURAL MEETINGS.

Several farmers' picnics were held in the picnic grove on the Station during the summer. These were largely attended, and much interest was shown in all phases of the work. Demonstrations with the Eureka Potato Digger and Cleveland Tractor were given during the early autumn. Demonstrations and lectures on the care of live stock and poultry were arranged and given to the students of the Prince of Wales College in December. The Officer in Charge attended the annual meeting of the Farmers' Institute, the annual meeting of the Co-operative Egg and Poultry Association, and the annual meeting of the Nova Scotia Fruit Growers' Association, and addressed meetings when requested. The Experimental Station was visited, during the early part of December, by the Governor General of Canada, and staff. They inspected the farm operations, and manifested a keen interest in the work that is being carried on.

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EXPERIMENTAL STATION, KENTVILLE, N.S.

REPORT OF THE SUPERINTENDENT, W. SANBY BLAIR.

THE SEASON.

The first half of April, 1918, was below normal in temperature, but because of being bright and the weather dry, it had every appearance of being more forward than usual. The latter half of the month was about normal in temperature, and because of little rain, together with bright days and drying winds, land was fit to work by the 24th of the month.

May came in warm with a mean temperature considerably above normal, in fact the mean for the month was 10 degrees above that of the previous season. May, like April, was unusually bright, the sunshine during the two months being over twice that of 1917. The rainfall during May was very light, in fact, except for two days, it was possible to continue work on the land uninterrupted during the whole month. This weather not only favoured the putting in of crops but brought along all fruit trees rapidly and the season of the blossoming of fruit trees two weeks ahead of the previous year and much earlier than normal. Amelanchier in bloom in 1917 on the 2nd June were in bloom this year on the 13th May. Gravenstein apples, which were in bloom in 1917 on the 7th June, were this year in bloom on the 18th May. The land was very dry toward the end of May and even wet lands could be worked, in fact such lands were drier than they had been at any time during 1917.

As a result of the continued dry weather during May, grasses did not make their usual growth and rain was much needed for this crop. June continued warm, the mean temperature for the first half, however, was higher than for the second half. There was a white frost noted on the 21st at this Station, and the temperature in many parts of the Valley fell to the freezing point on the 20th and 21st, doing very great damage to early planted potatoes and other tender crops. These frosts were more or less general all over Nova Scotia and many garden crops were injured.

There were light showers during early June and a rain of .92 inches on the 13th, which was much needed as the ground was very dry at this time. The month like April and May was unusually bright and the amount of sunshine recorded was much greater than for the three previous seasons. The weather on the whole was unfavourable for apple scab development and orchards were up to this time practically free from this disease.

There was a good rain of 1.15 inches on the 3rd of July, which was much needed. This rain fell rapidly and was not all soaked up by the soil. The temperature was normal and the amount of sunshine was very similar to previous years. Some scab developed from the 3rd to the 8th, the weather being damp and favourable. This was also the week when strawberries were being picked and much soft fruit resulted. August was dry and from the 9th to the 25th no rain fell. Lawns were showing the effect of this dry spell very materially and in some cases potatoes were wilting considerably on dry areas. Otherwise the month was normal. September was a wet month, rain falling on 14 days aggregating 8.06 inches. This thoroughly soaked the ground and made fall harvesting exceedingly difficult. There was a frost on the 12th in many parts of the Valley, doing much damage to corn and other tender crops. There was, however, no frost at this Station.

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The mean temperature, rainfall and sunshine for the six summer months for this year as compared with the five previous years, are given in the following table:—

Mean Temperature.

Month.	Mean Temperature.					
	1913.	1914.	1915.	1916.	1917.	1918.
April	41.9	36.8	39.26	39.81	58.4	58.74
May	46.2	50.72	46.14	49.07	43.63	53.97
June	56.7	56.2	56.8	58.3	60.36	57.58
July	65.4	62.88	64.0	66.045	65.93	65.4
August	63.3	63.0	63.8	64.9	67.67	61.86
September	54.3	57.6	57.25	58.93	54.94	58.76

Rainfall.

Month.	Rainfall.					
	1913.	1914.	1915.	1916.	1917.	1918.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
April	4.29	2.33	1.70	2.34	4.09	8.0
May	3.17	1.46	2.50	1.78	2.92	1.21
June	1.23	4.20	2.43	3.69	2.93	2.50
July	3.72	1.45	1.52	2.06	3.65	4.99
August	1.70	2.58	3.84	.86	5.15	1.72
September	2.55	3.65	.85	1.74	3.72	8.06
Total	16.66	15.67	12.84	13.07	22.46	19.17

Sunshine.

Month.	Sunshine.					
	1913.	1914.	1915.	1916.	1917.	1918.
	Hours.	Hours.	Hours.	Hours.	Hours.	Hours.
April	137.1	166.0	107.4	136.3	107.6	203.7
May	178.2	189.6	160.9	166.8	101.7	224.6
June	270.1	250.3	180.2	199.5	176.3	214.9
July	252.1	288.9	215.7	205.7	195.6	197.8
August	238.4	211.1	168.3	221.2	202.1	234.2
September	176.6	173.8	194.0	174.6	214.7	165.8
Total	1,232.5	1,259.7	1,020.5	1,088.7	998.0	1,241.0

October was wet during the early part of the month, but a dry spell from the 7th to the 13th gave an opportunity to get out potatoes on lands previously too wet to dig. There was a frost of 3 degrees on the 9th which killed corn and injured pumpkins and squash and similar tender crops not harvested. The latter part of the month was warm and as a result was suitable for the gathering of apples that had not earlier been stored. Turnip stecklings pulled and stored for seed because of the damp warm weather started growth considerably in storage and there apparently was no way of checking this. This fortunately was checked by the cooler weather early in November. There was a light fall of snow on the 18th and a light frost on the 17th, 18th and 19th.

November was fine and open until the 13th when 10 inches of snow fell. This remained on the ground until the 18th and 19th when 2.05 inches of rain fell and this,

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together with the melting snow, caused very heavy freshets, which, together with unusually high tides which broke the dykes in places, flooded low areas throughout the country. The snowfall on the 10th did very much damage from the snow being wet and no wind, clinging to trees and wires, breaking many telephone and telegraph wires, and damaging many orchard trees from the heavy weight of snow which collected on them. The last ploughing possible was on the 23rd of the month.

December was moderate throughout, the temperature going below 20 degrees on seven nights only, the lowest being 3 degrees on the 8th. The mean temperature was 27.32 degrees as compared with 19.66 degrees in the previous year for this month. The snowfall was 19 inches, of which 8 inches fell on the 29th making good sleighing until the 2nd of January. Other than this, there was no sleighing in December.

During January the temperature went below zero on two days only, on the 12th, 7 degrees below, and on the 21st, 2 degrees below. The mean temperature was 24.20 degrees as compared with 18.16 degrees in 1918. Rain fell on 8 days and snow on 7 days, the latter amounting to 15 inches, of which 6 inches fell on the 10th and 11th. This snowfall was followed by wind and cold weather which resulted in the only storm of the month of any consequence. The snowfall was light and because of the mild weather or wind, did not make sleighing. The only sleighing during the month was during the first two days.

February was mild throughout, the mean temperature being 27.31 degrees as compared with 18.88 degrees for the same month for the five previous years. The temperature went below 17 degrees on 6 days only, the lowest being 9 degrees. The snowfall was light, amounting to 5½ inches only, which went off soon after it fell. There was sleighing on the 26th and 27th only during the month. The sunshine was about normal.

March, like February, was mild throughout. The temperature went below 20 degrees on 8 days only. The coldest period was on the 14th when the temperature went to 8 degrees. The average of the mean temperature for the five previous years was 26.51 degrees, as compared with 33.32 degrees for 1918. There was no snow during the month, which is very unusual. Rain fell on 12 days, the total being 2.38 inches, with the heaviest, 0.69 inches, on the 10th. March closed with very little frost in the ground and the fields generally were free from excessive surface water.

METEOROLOGICAL RECORDS, 1918-1919.

Months.	Temperature.				Precipitation.					Hours Bright Sunshine.
	Maximum.		Minimum.		Rainfall.		Snowfall.		Total.	
1918.	Date.		Date.	°	Days.	Inches.	Days.	Inches.	Inches in rainfall.	
April.....	28	66	8	16	4	0.81	7	6	0.89	200.7
May	18	88	5	26	6	1.21			1.21	224.6
June	2	83	21	34	9	2.30			2.30	214.9
July	27	88	25	45	14	4.99			4.99	197.8
August	24	90	19	37	6	1.72			1.72	224.2
September	5	81	12	34	14	8.06			8.06	165.8
October	29	74	24	28	15	4.36			4.36	115.5
November...	1	58	26	15	9	3.14	1	10	4.14	80.5
December.	15	57	8	7	2	1.35	7	19	3.25	50.3
1919.										
January.....	2	53	12	- 7	8	3.23	7	15	4.73	51.5
February	21	40	10	9	1	0.99	5	9	1.94	95.0
March	20	48	14	8	12	2.38			2.38	130.1
Total						24.56		29	39.97	1,771.8

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LIVE STOCK.

Horses.

Eleven draught horses and one driving horse are kept at this station. No feeding experiments were conducted with horses during the year, and the aim has been to keep them in good working condition with the least possible feed.

Cattle.

The registered Shorthorn herd is made up of 15 cows, ranging from 2 to 12 years in age; 13 heifers over 1 year, 5 under 1 year; 6 bulls under 1 year; the herd bull, Jilt's Denis, and a young bull, May Don of Fredericton, 22 months old, to replace the herd bull a little later on, making a total of 41 head of registered stock. Six registered bulls ranging from 4 to 8 months old were sold for breeding purposes during the year. The only grade stock carried consists of 2 cows and 2 calves from these cows. These are grade Shorthorns.

Eleven of the cows completed their lactation periods during the year, and of these 8 are in the Record of Performance test. Six cows are in the mature class, 1 is four years, 2 are three years, and 2 are two years with first calf. The average days milking for the registered Shorthorn cows was 272 days, the dry period 133 days, the milk yield 4,370.9 pounds, per day 16.08 pounds, per cent fat 4.05, pounds of butter 205.03, value of butter \$95.18, value of skim-milk \$12.59, cost of feed from one milking period to the next one \$86.64, profit per cow \$21.13. Kentville Blossom made a loss of \$18.54. Louisa May 2nd \$7.60, and Kentville Countess \$2.06. The others ranged in profit from \$6.95 to \$70.44, the latter being the profit from Hedgyn Susan, who produced 7,072 pounds of milk, an average of 23.41 pounds per day while milking. No stock was lost from sickness or otherwise during the year.

Steers.

Twenty-four steers were carried during the winter. The object of the test was to determine the relative profits from feeding light and heavy steers. One lot of twelve steers averaged about 800 pounds and the other lot averaged 200 pounds heavier. The steers ran loose in a box stall 25 by 14 feet, the twelve together. They were fed alike, each receiving the same amount of feed. The summary of results was as stated below. The steers were put in during early October and dehorned. The test started October 14 and continued for 168 days. They cost 9½ cents per pound and were sold at 13 cents per pound:—

	No. 1. Largest Steers	Lot 2. Smallest Steers.
First weight average... .. lb.	1,066	785.4
Finished weight average... .. "	1,190.8	1,017.08
Average gain per steer... .. "	124.1	231.6
Daily gain per steer... .. "	1.095	1.378
Average sale price per steer at finish... .. \$	14.808	12.22
" valuation per steer at start... .. "	6.116	7.265
" increase in value... .. "	61.692	59.57
" cost of feed per steer... .. "	57.16	57.16
Profit per steer... .. "	4.532	2.41

Swine.

Five registered Yorkshire sows and one registered Yorkshire boar were obtained from the Central Farm in the fall. These have made excellent growth and some good stock should be had from these in the early spring.

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POULTRY.

The poultry equipment consists of two permanent 100-hen houses, 16 by 32 feet each, seven colony houses 8 by 12 feet each, two brooder houses, one duck house, and a supply house, with an incubator room in the basement.

The stock carried during the winter consisted of 195 pullets, 36 hens and 14 male birds. The breeds carried are Barred Plymouth Rock, White Wyandotte and Rhode Island Red. Forty cockerels were sold for breeding purposes.

The production of eggs and cost of feed during the winter were as follows:—

Month.	Eggs.	Price of Eggs.	Value of Eggs.	Cost of Feed.
		Cts.	\$ cts.	\$ cts.
November	51	50	2 16	46 48
December	402	63	21 11	44 68
January	1,286	61	67 50	58 16
February	2,634	55	93 22	59 77
March..	2,945	78	93 26	56 59
			277 25	265 68

The feed consisted of oats at night at the rate of 1 quart to 13 birds, and wheat in the morning at the rate of 1 pint to 13 birds. This was scattered in deep litter. In addition a dry mash of bran and crushed oats of equal parts was before the hens at all times in a hopper. Beef scrap was also in a hopper for them as they wished it. Mangels were supplied in the quantity that they would eat up clean in 2 hours.

BEES.

The bees carried over the winter of 1917-18 came through in good condition. The number of colonies was increased from seven to twelve. The average yield of honey per colony, spring count, was 40.7 pounds. The honey was sold at 23 cents per pound. The average value of production from each colony, allowing \$5 for the value of increase per colony was \$13.33. The bees were wintered again in cases outside, using planer shavings for packing material.

FIELD HUSBANDRY.

As stated in previous reports no attempt has yet been made to conduct definite rotation experiments. The practice followed, however, in all our field work has been to adopt a three-year rotation of grain following a hoed crop and seeding down to timothy and clover, using 8 pounds red clover, 2 pounds alsike and 8 pounds of timothy seed per acre.

CROP YIELDS.

The season was a favourable one for the growth and maturity of all cereal crops. The harvesting period, however, was wet and the expense of harvesting and drying the grain was greatly increased and quite unsatisfactory. Ten acres of Banner oats at the rear of the farm cleared in 1916 yielded 459 bushels. Five acres on land which was in turnips in 1917 yielded 410 bushels. The total oat yield was 949 bushels, and the other cereal crops from fertilizer areas and cereal plots made a total grain yield of 1,240 bushels. Six and one-half acres of dyked land produced 23 tons 1,260 pounds or 3 tons 1,326 pounds per acre. Ten acres of upland yielded 19 tons, and eight and one-half acres of limed and slag plots yielded 16 tons 1,610 pounds or 1 ton 1,954 pounds per acre. This with other small areas made a total hay crop of 69 tons 500 pounds.

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The corn for ensilage was a fair crop. One area of two acres of Southern Dent produced 13 tons 200 pounds per acre. Eight acres in another field yielded 11 tons 1,850 pounds, and three acres in another area yielded 14 tons 300 pounds per acre. The total put into the silo amounted to 164 tons 100 pounds. It was difficult to get Longfellow, the variety usually planted, and the crops were for the most part a mixture of Southern Dent, Canada Yellow and Longfellow.

The root crop was unusually good for the light lands at this Station. Four and one-half acres of turnips yielded 933 bushels per acre. The turnip crop stored for feeding was 4,100 bushels. Two acres of Danish Sludstrup mangels from seed produced at this Station yielded 983 bushels and 45 pounds per acre, and one and seven eighths acres seeded to Mammoth Red Mangels yielded 811 bushels and 33 pounds per acre. The total crop harvested amounted to 2,678 bushels of which 500 bushels of Danish Sludstrup were stored for seed purposes.

LIMESTONE AND FERTILIZER EXPERIMENTS.

Experiments having for their object a determination of the agricultural value of ground raw limestone, were continued this season. These tests were on plots of one-half acre each. Limestone is valuable principally in making possible a good clover growth. The limestone was applied and the slag as well in the spring of 1917 when seeding down. The yield of hay was as follows:—

	Yield per Acre. Pounds.
Slag $\frac{1}{2}$ ton, average of 4 plots.. . . .	3,996
" $\frac{1}{2}$ " lime 2 tons average of 4 plots.. . . .	4,615
Lime, 2 tons, average of 4 plots.. . . .	4,569
Check, average of 2 plots.. . . .	2,480

The experiments on the five acres devoted to orchard fertilizer tests and the four acres devoted to fertilizer tests conducted by the Division of Chemistry were continued this season. The tests started some years ago with commercial fertilizers on limed and unlimed plots were continued and a summary of the yield of Marquis Wheat on duplicate areas embracing all the tests was as follows:—

	Yield per Acre.		
	Straw. Lb.	Grain Bush.	Lb.
1918, 1919, 1920, limed and fertilized.. . . .	2,626	30	1
" " " not limed but fertilized.. . . .	1,991	"	48
" " " limed and not fertilized.. . . .	2,260	29	"
" " " not limed and not fertilized.. . . .	1,500	19	30

CEREALS.

Experiments with cereal crops consisted of one acre each of Marquis, Huron and Red Fife spring wheat; Manchurian, Canadian Thorpe and Charlottetown No. 80 Chevalier barley; Victory, Banner O. 49, Daubency and Liberty Hull-less oats; No. 61 O. A. C. spring rye and the Arthur and Golden Vine pea. A one-quarter-acre of Dawson's Golden Chaff winter wheat was also grown. The spring wheat averaged 24 bushels and 27 pounds per acre; the winter wheat 30 bushels and 20 pounds per acre; the barley 29 bushels and 27 pounds per acre. The three varieties of oats averaged 72 bushels and 21 pounds per acre. The hull-less oat produced 45 bushels and 13 pounds per acre; the spring rye 36 bushels and 23 pounds per acre, and the peas 26 bushels and 40 pounds per acre. The Huron wheat, grown this season for the first time here, is a bearded wheat of good quality and seems more suitable to our conditions than either the Red Fife or Marquis. The yield was 27 bushels and 40 pounds per acre. The Hull-less oat, Liberty, has done remarkably well but seems very liable to smut and should be treated with formalin before seeding. The O. A. C. No. 61 spring rye made a vigorous growth and appears to be a very satisfactory sort.

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FORAGE CROPS.

Owing to the impossibility of getting reliable seed of the various root crops usually tested, and because of the shortage in seed of different sorts of corn for ensilage, no tests were carried with these crops during the past season.

The one acre of alfalfa which produced a satisfactory crop in 1917 winter-killed badly and as only about fifteen per cent of the plants started, the area was ploughed and seeded to corn. The forty-eight one-fortieth-acre plots of different grasses and clover mixtures seeded in 1916 gave interesting results. The results would show that 8 pounds of red clover, 2 pounds of alsike and 8 pounds of timothy give the most satisfactory yield of hay. None of the grasses is better than timothy for hay yields. Red clover produces a larger yield per acre than alsike, but a larger yield is obtained from a mixture of 8 pounds of red and 2 pounds of alsike, than to use 10 pounds of red clover or 6 pounds of alsike per acre separately with any of the grasses tested.

ROOT SEED PRODUCTION.

The turnip steckling grown in 1917 were planted in the spring of 1918. Twenty-one acres of Corning Green Top yielded 9,718 pounds of seed, or an average of 462.8 pounds per acre. Twenty-one acres of Canadian Gem yielded 10,542 pounds or 502 pounds per acre. Thirty-two acres of Canadian Gem yielded 10,177 pounds or 318 pounds per acre. The total area planted was 74 acres, and 30,437 pounds of seed was produced, an average of 411.3 pounds per acre. This was grown on land not entirely suitable as for the most part it was ploughed out of sod in the fall of 1917. The area on which this was grown was rented from farmers in the adjoining district.

Experiments were carried on to determine the distance apart most suitable for turnip seed production, and also the size of root most suitable. With rows $2\frac{1}{2}$ feet apart the yields were about the same, from 16 to 24 inches apart in the row, and at a greater distance, the yields were reduced. The yields were greater from the area with rows $2\frac{1}{2}$ feet apart than from those with the rows $2\frac{3}{4}$ and 3 feet apart. The yield from the roots 1 to 2 inches in diameter was 726 pounds per acre and from roots 4 inches and over 799 pounds per acre.

The early planting of roots for seed is very important, owing to the growth developed in storage as spring approaches.

The cost per acre, including rental of land and fertilizers, for two years covering the growing of the stecklings and the production of seed, and all work connected therewith for the two years, was \$191.44 per acre, and at the average yield of 411.3 pounds per acre the cost per pound was 46.5 cents.

Thirty-four acres of stecklings were grown and stored for seed production in 1919, made up of $11\frac{1}{2}$ acres of Canadian Gem, 15 acres of Corning Green Top and $7\frac{1}{2}$ acres Ditmars Swede. These were stored in cellars in crates holding about 1 barrel each.

Almost one acre was planted to Danish Sludstrup mangel of roots selected in the fall of 1917 and grown at this Station. The yield was 1,407 pounds seed per acre.

HORTICULTURE.

The orchard embracing an area of nearly 47 acres planted in 1912-13 and 1914, has made strong growth, and in some cases trees have produced a few apples. The spaces between the trees have been utilized for growing various agricultural crops such as potatoes, corn and roots, and grains and clover following a three year rotation. A space at least three feet at each side of the row of trees is kept cultivated during the spring months.

Experimental work with vegetables was not carried on to any considerable extent during the past year. Variety tests were continued with potatoes and a number of tests to determine the distance apart it is best to plant, and the kind of set to use,

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were continued. The crop on the whole was fairly satisfactory, the yield ranging from 200 to 400 bushels, and averaging 260 bushels per acre.

The lawns, shrubs and trees and flowering plants made splendid growth during the season. The lawns kept green during the whole season and the shrubs are now well established and are making quite effective groups. The flowering plants were a source of pleasure during the whole season.

The experimental orchard work which has been carried on at Berwick, Bridgetown and Falmouth, was continued and much definite information as to the influence of different sprays for apple scab control, and the use of different forms of poisons for insect control obtained. All the tests so far conducted would point to the importance of thorough spraying before blossoming. The tendency is to delay the spraying too long, resulting in scab infection on the leaf before the spray is applied, and from this the disease is spread to the fruit. Lime-sulphur arsenate has again given good results, and the fruit from trees sprayed with this has been superior to the Bordeaux sprayed fruit.

FARM IMPROVEMENTS.

Buildings.—The only building erected during the year was a pig house 60 feet long and 18 feet wide. The building is a shed roof construction 7 feet at the back and 11 feet in front. The ceiling is 6½ feet high, constructed of boards spaced about three-quarters of an inch apart and the space above this filled with straw. There are 5 pens 14 by 10 feet each and a passage way 4 feet wide at the rear, and a feed room 10 by 18 feet.

Clearing Land.—No additional land has been cleared during the year except to burn some brush at the rear of the farm.

EXHIBITIONS.

With the large amount of other work, we found it impossible to make an exhibit of farm produce at the shows held in Nova Scotia during the season.

AGRICULTURAL MEETINGS.

Agricultural meetings were attended at different periods throughout the year and addresses delivered on suitable topics.

EXPERIMENTAL FARM, NAPPAN, N.S.

REPORT OF THE SUPERINTENDENT, W. W. BAIRD, B.S.A.

THE SEASON.

The winter of 1917-18 was a typical Canadian winter. Perhaps an extraordinary depth of snow lay on the ground throughout. Cold, stormy weather continued during the first part of March, but the latter part of the month was very springlike. April was somewhat changeable with warm days and sharp frosty nights.

The weather during May was much warmer. A thunder shower was recorded on the evening of the 23rd, which was very beneficial to germination. A start was made in planting stecklings on the 10th and seeding commenced on the 15th.

Cool weather prevailed throughout June. Two degrees of frost were recorded on the 19th and 20th. This frost did considerable damage in gardens throughout the neighbourhood.

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The first three weeks in July were not at all summerlike. The last week, however, was fine and warm. Exceptionally fine weather continued during August, which afforded an excellent opportunity for hay making.

Several severe frosts occurred during the first week of September, doing considerable damage to garden crops. A heavy rain storm was experienced on the 21st: on which date high tides also prevailed. Dykes broke in many places and in the surrounding district much damage was done to hay on marshes.

October was somewhat unsettled and a heavy precipitation was recorded.

Fine weather was experienced until the 14th of November, when a heavy wind and snow storm was recorded. This storm did considerable damage throughout the county. Electric wires were broken down and light and telephone connections destroyed. Harvesting operations were considerably retarded.

December was very unwinterlike, being very much milder throughout than for the same period the previous season.

January on the whole was very fine, there being but one exceptionally cold day, the 11th. On this day a heavy blizzard was experienced.

Bright sunshiny days with frosty nights were experienced until the 26th of February.

On the evening of the 26th the heaviest snowstorm of the season was recorded. 7 inches of snow falling in all.

March has been unsettled with alternate rain and snow squalls.

METEOROLOGICAL RECORDS, 1918-19.

Month.	Temperature.		Precipitation.			Total. Sunshine.
	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
1918.			Inches.	Inches.	Inches.	Hours.
April	67	44	0.77	3.00	1.07	176.50
May.	80	24	1.40		1.40	210.40
June	80	30	3.14		3.14	212.20
July.....	81	58	3.43		3.43	177.20
August.....	80	33	1.33		1.33	235.20
September.	81	30	5.25		5.25	105.50
October..	67	23	5.21		5.21	107.40
November	56	12	2.66	12.00	3.86	88.20
December	49	-3	1.22	14.00	2.62	57.20
1919.						
January..	52	-13	1.24	3.25	1.56	86.70
February.....	49	2	0.48	15.00	1.98	101.70
March ..	53	0	2.24		2.24	120.60
Total for year			28.37	47.25	73.09	1747.50

LIVE STOCK.

Horses.—The eighteen horses on hand March 31, 1919, at the Experimental Farm, Nappan, consisted of three matched spans of heavy geldings, four pure-bred Clyde mares, one medium weight gelding, two light horses used for express and driving work and five colts; two pure-bred Clyde fillies, one year old; one pure-bred Clyde filly, two years old; one pure-bred Clyde stallion, one year old and one light grade colt, one year old.

All horses are in good condition and the colts have made a most satisfactory growth during the season. Data regarding the cost of rearing colts to maturity are being collected.

Dairy Cattle.—The “grading up” experiment has now completed its sixth year’s work. The object of this is to show the results obtainable from the use of a good, pure-bred, dairy sire on the average cow. Most satisfactory results have been obtained, as

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indicated by the fact that in most cases, where the progeny is compared with that of the dams, the percentage of superiority runs from 14 to 71 per cent or an average of about 25 per cent, which is most encouraging. Moreover the striking evidence of the necessity of most careful and judicious feeding is brought out if the best and most profitable returns are to be expected.

Beef cattle.—During October of 1917 some forty-two steers of good beef type were purchased costing on an average \$8 per hundred, live weight, and were sold in May, 1918, at \$11 per hundred, live weight, leaving a spread of \$3 between buying and selling price. The forty-two steers were divided into four lots and fed as per summary table, which gives in concise form the results of the test. It may be noted that the profits per steer range from \$21.88 to \$40.17 for the feeding test and that the daily rate of gain was from 1.58 pounds to 2.65 pounds.

The following table is a summary of the four lots fed, giving the main points of interest for comparison, 1917-18.

		How Housed.			
		Open Shed	Loose in Box Stall.	Loose in Box Stall.	Loose in Box Stall.
		Lot 1.	Lot 2.	Lot 3.	Lot 4.
		Roots and Meal.	Roots and Ensilage and Meal.	Roots and Meal.	Roots and Meal.
Number of steers....		34	4	2	2
Average weight of steer at start.....	lb.	1,082	1,093	1,375	1,320
Daily rate of gain per steer.....	"	1.58	2.67	2.65	2.41
Cost of 1 lb. gain	cts.	19.23	11.43	11.50	12.67
Cost of feed per steer per day.	"	30.52	30.52	30.52	30.52
Profit per steer.....	\$	21.88	41.85	40.17	31.52

In November of 1918, twenty-four steers were fed. These were not of as good beef type as those fed during the winter of 1917-18, being a mixture of Guernseys, Holsteins and Shorthorn grade. They cost on an average \$8.25 per hundred, live weight and were sold March 31, 1919 at \$13 per hundred live weight, the highest price realized on the Montreal market for beef up to and including that time. The spread here, you will note, was \$4.75—exceptionally good. These steers were divided into three lots of eight each. Lot one was subdivided. See summary table for results and method of feeding.

The following table is a summary of three lots fed together with the sublots of Lot 1, giving the main point of interest for comparison, 1918-19.

		How Housed.					
		Tied in Barn.	Loose in Box Stall.	Loose in Box Stall.	Tied in Barn.		
		Lot 1.	Lot 2.	Lot 3.	Sublot 1.	Sublot 1.	Sublot 1.
		Mixed Lot.	Good Type.	Good Type.	Grade Guernseys.	Grade Holsteins.	Grade Shorthorn.
		Feed.					
		Roots and Meal.	Roots and Meal.	Roots and Meal.	Roots and Meal.	Roots and Meal.	Roots and Meal.
Number of steers.....		8	8	8	2	2	2
Average weight of steers at start..	lb.	1,013.75	1,067	990.75	1,053	1,053	1,053
Daily rate of gain per steer.....	"	1.875	1.62	1.866	2.52	1.80	1.93
Cost of 1 lb. gain.....	cts.	15.90	16.02	13.86	11.82	16.5	15.00
Cost of feed per steer per day.....	"	29.82	25.88	25.88	29.82	29.82	29.82
Profit per steer.....	\$	43.25	46.29	42.76	43.66	44.24	45.78

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From the above results one cannot but feel that there is more room for the finishing of good beef with fair profit for labour, feed and money invested and that these results should go toward encouraging a greater production of good beef cattle for they are surely needed.

Sheep.—Two flocks are kept at Nappan, one a good pure-bred Shropshire flock, the other a grade flock of mixed blood of Leicester and Shropshire. The ewes are all being bred to a pure-bred Shropshire ram. The pure-bred flock consists of 16 mature ewes, 10 two-shear, 12 shearlings, 1 mature ram and 1 shearling ram. There are, in addition to these, three more shear rams and 6 shearling rams for breeding purposes. These are for sale. The lamb crop for 1918 was good. Some 20 lambs were dropped during the season. The grade flock consists of 16 mature ewes, 6 grade two-shears, 6 grade shearlings. The lamb crop from these was fair. All wool from both flocks sold at an average price of 82 cents, which was the highest price realized for wool here.

Swine.—Three herds are kept at this Farm—one pure-bred Berkshire herd, consisting of three mature sows and two boars; one pure-bred Yorkshire herd, consisting of eleven sows and one boar; one grade Yorkshire and Berkshire herd, consisting of six sows and one boar. The past season has been a very successful one with the swine herds. Some seventy-one little pigs have been raised and fed as feeders, or sold as young pigs.

POULTRY.

A fairly successful year's work has been carried on in poultry; especially is this true of the latter part. Four breeds are kept at Nappan, namely, Barred Rocks, White Leghorns, Rhode Island Reds and White Wyandottes. The number of each wintered during 1918-19 are as follows: Barred Rocks, 25 hens, 40 pullets, 2 males, total 67; White Leghorns, 70 hens, 25 pullets, 4 males, total 99; Rhode Island Red, 11 hens, no males, total 11; White Wyandottes, 6 hens, 4 pullets, 1 male, total 11. Total eggs laid for the four winter months December, 1918-March, 1919, for Rocks was 1,402 at an average cost per dozen of 74.4 cents; for Leghorns, 2,338, at an average cost of 59.68 cents per dozen; for Rhode Island Reds, 392 eggs at an average cost of 70.01 cents per dozen; for Wyandottes, 275 eggs at an average cost per dozen of 76.32 cents. Total eggs set to date 200. The average per cent fertile was 89.5, which is good for early hatches.

BEEES.

The past season was only a fair average year for honey production. The weather during June was not the most desirable kind for the bees to work. The highest one-day record of honey gathering by the individual colony which was kept on scales was 10 pounds; date of record July 13. Some fifteen colonies are kept. The average production per colony spring count was 63.8 pounds and the total extracted honey produced was 702 pounds, which sold readily at 20 cents per pound in ten-pound lots.

FIELD HUSBANDRY.

Rotations.—Three rotations are still being carried on at Nappan, namely, Rotation "B" (five years),—first year roots or corn; second year grain; third year clover hay; fourth year grain; fifth year hay, fall ploughed. Rotation "C" (four years),—first year roots or corn; second year grain; third year clover hay; fourth year pasture, fall ploughed. Rotation "D" (three years),—first year roots or corn; second year grain; third year hay, ploughed in autumn. Any of these are good rotation when used to suit the individual case. In any case some systematic method of rotation of crop should be adopted on any farm if the best returns are to be realized from the soil, with the least amount of labour and fertilizer expended.

Crop yields.—The total area of grain including test plots was 39 acres, 3 acres of which was in wheat, 2 acres in test plots of wheat, oats and barley; 27 acres in oats.

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2 acres in barley, 2 acres in mixed grain and 2 acres in buckwheat, test plots, etc. The average for field lots of grain was for wheat 24 bushels 25 pounds; oats 36 bushels 27 pounds; barley 38 bushels 45 pounds; mixed grain 39 bushels. Wheat, barley and buckwheat were of excellent quality, but oats were only fair. In roots, including test plots, there were 10 acres. The average yield was 883 bushels per acre. Potatoes 1½ acres including test plots. The average yield was 255 bushels 35 pounds. The season, especially the latter part was most unfavourable for potatoes as the percentage of rot was the highest for years. The five acres of ensilage corn was a failure. The 41 acres of upland hay yielded an average of 2 tons 106 pounds per acre of good mixed clover and timothy hay. Owing to the dykes breaking several times during the last season and flooding the marsh badly the returns from same were very low. The 50 acres of marsh land only gave an average of 1,819.5 pounds per acre—the lowest yield ever taken off it. It will be several years before it is back to normal, but once back it should be better than ever.

CEREALS.

Thirteen varieties of spring wheat were tested in duplicate plots of one-sixtieth of an acre each. The highest yield this year was from Red Fife, 30 bushels 30 pounds; the lowest was from Bishop, 13 bushels 4 pounds. The average for all varieties was 24 bushels 17 pounds. Fifteen varieties of oats were tested, same kind and size plots as that for wheat. The highest yielder was Banner, 66 bushels 23 pounds; Daubeny lowest, with 39 bushels 24 pounds. The latter is an early ripening oat, but weak in the straw. The average for all varieties was 53 bushels 27 pounds. Three varieties of six-rowed barley were tested in duplicate plots of one-sixtieth of an acre. Stella gave the highest yield, 22 bushels 9 pounds. White Manchurian was the lowest, 20 bushels 22 pounds. The average for all plots was 21 bushels 9 pounds. Three varieties of two-rowed barley were tested in duplicate test plots of one-sixtieth of an acre each. The highest yielder of the two-rowed was O.A.C. Charlottetown No. 80, 33 bushels 6 pounds. The lowest was French Chevalier, 24 bushels 33 pounds. The average for all plots was 28 bushels 6 pounds, slightly better than the six-rowed barleys. Five varieties of buckwheat were tested in plots of one-twentieth of an acre each. Japanese gave the highest yield, 22 bushels 24 pounds. The lowest was rye, 9 bushels 28 pounds. The average for all plots was 17 bushels 12 pounds.

Field Crops of Grain.—One acre of Huron gave 25 bushels of beautiful wheat. In fact, Huron this year was much superior to any of the other varieties. One acre of Red Fife yielded 24 bushels 45 pounds of fair grain. One acre of Marquis gave a total yield of 24 bushels 30 pounds. The grain was of much better quality than Red Fife, but not quite as good as the Huron. The five acres of Banner oats grown for seed produced 227 bushels, or an average of 45 bushels 14 pounds. One acre of No. 80 barley yielded 42 bushels 31 pounds per acre of good seed grain. One acre of French Chevalier gave 35 bushels 12 pounds of very good seed grain. The past season was somewhat more favourable for barley than was the previous season.

FORAGE PLANTS.

Thirteen varieties of Indian corn were sown in test plots, but the crop was a failure, hence no record was kept on the yields.

Turnips.—Seventeen varieties of turnips were sown in duplicate test plots of one-hundredth of an acre. The highest yield was obtained from Good Luck, 24 tons 100 pounds, or 962 bushels. The lowest yield was from Monarch, 13 tons 1,900 pounds, or 558 bushels per acre. The average for all varieties was 15 tons 160 pounds, or 723 bushels 10 pounds.

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Mangels.—Six varieties were tested in duplicate plots of one-hundredth of an acre. The highest yield was obtained from Half Sugar White, 14 tons 600 pounds, or 572 bushels. The lowest was Golden Tankard, 9 tons 1,400 pounds, or 388 bushels. The average for all varieties was 11 tons 816 pounds, or 456 bushels.

Sugar Beets.—Four varieties were tested in duplicate test plots of one hundredth of an acre each. The highest production was from Russian Crown, 6 tons 100 pounds, or 242 bushels per acre. The lowest was Ontario Champion, 4 tons 500 pounds, or 170 bushels per acre. The average for all crops was 5 tons 300 pounds, or 206 bushels.

Seed Production.—Some 16 acres were planted to turnip stecklings, Monarch being the variety used. The four best acres and first planted had a 90 per cent stand and gave a total yield of 4,800 pounds, or an average of 1,200 pounds per acre. The other four acres in this particular field gave only an average yield per acre of 256 pounds, or a total of 1,032 pounds, or average per acre for the full eight acres of 729 pounds per acre. The remaining 8 acres was on newly cleared ground. They were late when planted and many plants went bad at crown. The stand was not more than 50 per cent. The average yield per acre from this field was 271 pounds. The grand total for 16 acres was 8,000 pounds of good Monarch seed, or an average per acre of 500 pounds at approximate cost of 50 cents per pound. Ten acres more were sown to turnip seed for the production of stecklings for the season of 1919, but the ground was very wet; hence not more than a third of a yield was realized. The weather was very bad for harvesting same.

HORTICULTURE.

Fruits.—All large fruit gave a very satisfactory production. What it lacked in quantity it made up in quality, being very free from worms and scab. The canker worm throughout the orchard was again very much in evidence this year and caused much damage, especially to those orchards that were not sprayed. Some of the varieties in the new commercial orchard, which are just nicely starting to bear fruit, give promise of being good producers, such for instance as the Charlamoff, Arabka Winter, McIntosh Red, Wolfe River and Grimes Golden.

Strawberries.—Fifty varieties were tested in plots of $\frac{1}{32}$ s of an acre each. Some of the most outstanding varieties and ones that can be recommended are Senator Dunlop, Williams, Be'erwood, and Glen Mary. The six highest producers for the past season are Cole Seedling, yielding per acre 14,256 pounds; Haverland, 12,705 pounds per acre; Michaels Early 12,144 pounds per acre; Crescent 11,715 pounds per acre; Jas. Vick 10,494 pounds per acre and Williams 10,197 pounds per acre, all of which are good yields.

Bush fruit.—Practically all the bush fruits came through the winter in good condition and made splendid growth through the season, excepting gooseberry. These have never done well here especially the English varieties. Mildew and frost together seem to kill them out. All currants gave much better returns than for 1917. Many of the varieties doubled their yields. Raspberries came through the winter in good condition and made a very strong growth during this season, but did not fruit so well as in 1917. Possibly the growth was too strong.

Potatoes.—Thirty-one varieties of potatoes were tested in duplicate test plots of $\frac{1}{100}$ of an acre each. The highest yield per average of two plots per acre was obtained from Aarons Chief, 369 bushels 10 pounds. The lowest was from Dalmeny Beauty, 113 bushels 20 pounds. The average yield for all plots and varieties was 362 bushels 17 pounds.

Elite stock.—The improvement of the strain of Irish Cobbler, Green Mountain, Wee McGregor, Empire State, Carman No. 1 and Rawlings Kidney was continued as usual.

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Shrubs.—Many of the taller shrubs, such as the arbor vitae and spireas, suffered from the heavy falls of snow during the winter of 1917-18. Otherwise they came through the winter in fairly good condition and made good growth during the season. Perennials wintered well and made strong growth during the season. A few of the more tender ones got set back by the heavy frost in June.

Annuals.—Most of the annuals were started in hotbeds between April 10-18 and were transplanted into the open between the 3rd and 18th of June. Unfortunately they received a severe setback in the early stage of their growth after being set in the open by the heavy June frost, but after they recovered (those that did) they made a splendid growth and gave a most profuse bloom lasting well into the fall.

Seed production.—A start was made in the production of garden seed. As it takes two years to produce the seed of most of the garden stuff there is very little to report this season, other than that a start was made and some materials stored to work on next season.

Farm Improvements.—The new piggery which was started in 1917 was completed during the early part of the summer and given two coats of paint, making a most attractive looking building. The roof of the large main barn was shingled on both east and west sides, taking in all about 65,000 shingles. Ventilators were repaired. The roofs on the bull and calf barn and the old piggery were patched and renailed.

A new chimney was built in the harness room of the horse barn, also a big double chimney in the new piggery. All buildings were gone over and doors, windows, etc., repaired where it was found necessary.

Fences.—All line fences were gone over and repaired and a new portion of 1,500 feet of badly broken-down pole fence was replaced with a woven wire fence.

Draining.—About four acres of field B3 were underdrained with three-inch tiles, thus completing the field. Two or three acres of the north end of B2 was also laid with three-inch tiles. A large six-inch main was laid from the northeast corner of B2 down through the lowest portion of the field coming out at about 100 feet north of the southwest corner. A large six-inch main was laid just at the south end of B2 and B3, running west to connect with the old main about 75 feet east of the southwest corner of B2. Part of the drains from B3 empty into these mains. Another six-inch main drain was laid through the swamp of the newly cleared field north of main driveway at the back end of the Farm. About three acres of this swamp was laid to three-inch tiles, emptying into the main. On the south side of the Farm next to the Roach property and in the newly cleared field another four acres was laid with three-inch tiles. Owing to weather conditions and influenza these two swamps could not be completed last fall, but will be this coming season.

Barnyard.—As the stones were gathered off the fields they were hauled into the yard, thus enlarging the stone portion of the yard very materially. This yard, when completed, will be a permanent job.

Farm road.—All farm roads were repaired during the season and put in good shape by cultivating and harrowing as often as necessary to keep down the weeds. The split log drag was used to keep them rounded so that the water would run off readily. The main road from Farm to station was also put in good repair and ditches cleaned out thoroughly in order to get proper drainage. One of the most essential things in the upkeep of good roads is proper drainage. Owing to the dykes breaking and marshes flooding this road was badly washed and gullied out. A good cinder sidewalk was also built from the Farm to the station, all of which adds much to the general appearance of the Farm approaches.

Marsh land.—Because of the dyke breaking during the high run of tides during October, much damage was done to the marsh lands. Then there was considerable

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expense in getting them repaired. Weather conditions were bad; influenza was raging at the time and help was next thing to impossible. Hence a dyking machine was used for the building up most of the new dyke. While it is doubtful whether the machine is any cheaper than doing the work by spade this can be said that where a new dyke is being built there can be a more substantial dyke built at just the same cost as by hand, but it takes a little more land to do it. However, once it is grassed over the dyke is a more secure one. About 600 feet of new dyke was built and much repair work put on the old dyke where weak spots were noted.

Excursions and Visitors.—Two large excursions were held at the Farm during the season and seven or eight smaller ones. The largest was that held by the Cumberland County Farmers' Association, at which addresses were given. The attendance was over 3,000. The next was held by the Orangemen. The attendance at this picnic was about 2,000. Then there was a small excursion from Point de Bute, N.B.; one from Sackville district, N.B.; one from Joggins and River Hebert and one from Southampton and West Brook district. Altogether the visitors to the Farm during the season would number approximately 6,000.

Meetings and Exhibitions.—During the year the Superintendent attended many meetings and acted as judge at ploughing matches as occasion called for. The following is a list of same: April 24, Town garden lot meeting, Amherst, N.S.; April 26, Sheep Shearing demonstration, Experimental Farm, Nappan, N.S.; June 20, Town garden lot cultivation meeting, Amherst, N.S.; September 18, ploughing match at Amherst, N.S.; October 15, ploughing match at Truro, N.S.; December 3, Poultry Show at Halifax, N.S.; December 10-11, Poultry Show at Amherst, N.S.; January 21-23, Fruit Growers' meeting at Bridgetown, N.S.; March 12, Dairymen and Farmers' Association meeting at Fredericton, N.B.; March 18, Agricultural meeting at Williamsdale, N.S. One lecture a week was given to guards at Detention Camp, Amherst, N.S., from November to March.

A farm exhibit was put up at the following exhibitions—Inverness, September 9-12; Antigonish, September 23-24; Stewiacke, September 26-28 and Sydney, October 1-6.

EXPERIMENTAL STATION, FREDERICTON, N.B.

REPORT OF THE SUPERINTENDENT, W. W. HUBBARD.

THE SEASON.

The winter of 1917-18 was one of the coldest and stormiest on record in New Brunswick. After freezing on November 7, the ground did not again thaw. Two inches of snow fell on November 23, followed by a cold rain, covering the ground with ice. December brought a snowfall of eleven inches on the 2nd, followed by cold and high winds; eight inches more snow fell during the month. The mean temperature for December was 9.8 degrees against a forty-three-year average mean of 19 degrees. There was no thawing weather during January, but almost continuous high winds, intense cold and thirty-two inches of snowfall. The mean temperature was 8 degrees against an average of 13 degrees. February brought a continuation of the January weather with a slight thaw in the latter part, which settled the snow somewhat. The sunshine for February was only 90 hours, approximately two-thirds of the normal average for that month. March continued cold and rough with a temperature of 20 degrees, 6 degrees below the average. Snow went off rapidly towards the last of the month. April brought warm days and frosty nights with sunshine above the average. There was but little rain, but the great depth of snow furnished abundant soil

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moisture. May was fairly warm with no frost after the fifth, dry and favourable for work on the land. June turned cold, with frost in some localities every week, destroying tender crops and even potatoes. July, during the first fifteen days, brought continuous wet weather, aggregating five inches of rainfall and drowning out crops on low lying lands, and preventing cultivation, gave weeds generally a tremendous start. Temperatures were normal, but only half the usual sunshine. Late blight started among early potatoes and caused much loss later on. August was cool and dry and so was September up to the 11th, providing good harvest conditions, but the latter half of the month brought a deluge, with six inches of precipitation and very little sun, seriously damaging late grain and flooding potato and root fields. The first week of October was wet, but after that dry, warm conditions enabled the harvesting of potatoes and roots in good order. November followed with mild, dry weather, roots were handled up to the 15th and ploughing continued till the 23rd. The winter months following were the finest ever experienced in New Brunswick. Snow came on Christmas day and gave an even covering. The snowfall in January was thirty inches, with a notable absence of wind. February was bright and mild and there was no thawing weather until after March came in, when there was a break up of roads and ice, after which fields were practically bare.

METEOROLOGICAL RECORDS.

Month.	Temperatures F.			Precipitation.			Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	
				Inches.	Inches.	Inches.	Hours.
1918.							
April..	39.7	67.5	18	2.44		2.44	192.05
May..	53.5	88	28	2.21		2.21	209.05
June...	57.4	86	34	3.06		3.06	218.65
July	66.3	90	48	5.57		5.57	122.9
August	62.3	86	42	1.52		1.52	239.5
September	55.4	76	31	7.62		7.62	121.99
October.	47.9	67	27	1.36		1.36	141.7
November	32.8	61	11	1.82		1.82	86.15
December	40.2	48	1	.34	8.5	1.19	76.65
1919.							
January	13.9	39	-18	1.02	32	4.22	71.7
February	20.6	39	-17	Nil.	15.5	1.55	124.8
March	29.59	55	-7	2.25		2.25	159.55
				33.21	50	38.81	1,764.69

LIVESTOCK.

Horses.—Three pure-bred Clyde mares, six grade Percheron mares, one grade Percheron gelding, one grade Clyde gelding, two grade draught geldings, one driving mare and a general purpose gelding were used on the Station during the year. A pure-bred Clyde filly, a grade Clyde filly, three grade Clyde colts, a grade Percheron colt, a grade Percheron filly and a half-bred colt, varying from weanlings to two-year-olds, were reared. Two three-year-old grade Percherons were kept on cheap winter rations at a cost for three months of \$13.48 each. The grade Percheron mare weighed 1,430 pounds on December 31, 1918, and 1,425 pounds on March 31, 1919. The grade Percheron gelding weighed 1,435 pounds on December 31 and 1,380 pounds on March 31.

Dairy cattle.—The pure-bred herds of Dairy Shorthorns, Ayrshires and Holsteins were somewhat increased by births and some very promising heifers of these breeds are coming in. The best Shorthorn cow from November 17, 1918 to March 31, 1919 gave 6,999.1 pounds milk, 272.6 pounds butter in the 138 days, a per diem yield of 50.7 pounds milk and 1.97 pounds butter. The best Holstein from January 20 to March

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31 gave 3,882.1 pounds milk and 153.4 pounds butter, a per diem yield of 55.4 pounds milk and 2.19 pounds butter. In the grading up experiments, first cross Holsteins nearly all completed their first lactation periods and in all but two cases there was a substantial improvement in yield over their dams. The first-cross Dairy Shorthorn heifers are coming in and making a showing that will place them in most cases well ahead of their dams' records. A very nice lot of first cross Ayrshire heifers will be bred during 1919. A number of bull calves have been sold during the year to New Brunswick farmers. A thorough and very satisfactory test of wheat screenings, known as Standard Stock Food, was made on the dairy herd. The cost of rearing dairy heifers from birth to calving is being kept but complete records are not yet available. On account of lack of stable room and the very high price of hay, no feeding cattle were put in. Some grade cows, as they approached the end of their lactation period, were disposed of for beef.

Sheep.—Pure bred Shropshires and grades did well during the year, raising a good crop of lambs in 1918. A flock of Cheviots, eight ewes and a ram, was purchased and has given a good crop of lambs in 1919. Ram lambs were sold for breeding purposes and ewe lambs kept.

Angora Goats.—Three goats died during the year, one from pneumonia, one from wool balls in the stomach and one from blood poisoning. The eight remaining females in 1919 have dropped ten kids, all of which are healthy and growing. While the flock in the summer of 1918 undoubtedly destroyed many bushes, they were too few in proportion to the size of the pasture area to show what they could do as efficient bush killers.

Swine.—The five pure-bred Yorkshire sows gave spring and fall litters. There was a keen demand for the spring pigs for breeding purposes, but the fall litters would not sell and have been kept on. These pigs were given dry, closed-in sleeping quarters and daily exercise in a sheltered yard and not one case of sickness or lameness was noticed. The sows were wintered in the yard with small cabins for sleeping quarters and fed largely on mangels.

POULTRY.

The pure-bred flocks of Barred Rocks, White Wyandottes, Rhode Island Red and White Leghorns were kept on and some good males were purchased or received from the Central Experimental Farm. The laying flock has averaged about 275 birds. All laying hens have been trap-nested and so far as breed is concerned there is not a great difference in yearly egg yield, but there are individual hens in each breed that far outstrip others in number of eggs laid. A few turkeys were added during the year, but the mortality was very heavy while they were small and while they were shooting the red. The principal trouble seemed to be the result of the Blackhead disease causing ulcerated livers and generally sudden death.

BEEES.

The severe weather of the winter of 1917-18 was adverse to the successful out-door wintering of bees. Out of six colonies from 1917, only two survived; these were increased to six by swarming and division and four colonies were purchased. These went into winter cases weighing from 64 to 72 pounds each. Two were placed in individual cases in the honey-house and eight in the winter cases. The two colonies in the house are apparently strong and all but one in the winter cases show signs of spring strength.

FIELD HUSBANDRY.

The crops most extensively grown were oats, potatoes and turnips. Oat seeding began on May 18 and was completed on the 3rd June. The total acreage was forty-

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eight and three-quarter acres and the crop aggregated 1,611½ bushels, an average of 33⅓ bushels per acre. Of the total area, twenty acres was seriously damaged by flooding and gave only 15 bushels per acre, so that on the well-drained land the yield was 46½ bushels per acre. The varieties were Banner and Ligowo. Three acres were sown to White Fife wheat on the 7th and 14th May and gave a crop of 70 bushels. There was slight damage from bacterial disease but in the main the sample was good. Twelve acres sown to buckwheat gave 317 bushels of grain with at least 60 bushels shelled in the field on account of heavy rains in September and the handling necessary in drying. Four acres of buckwheat on undrained land was flooded and from it only 28 bushels was recovered.

Winter rye, heavily pastured the preceding fall, gave a yield of 20 bushels per acre. Four acres seeded on the 17th September has come through the winter with about 20 per cent loss from winter-killing.

An acre of Dawson's Golden Chaff fall wheat has come through the winter with not more than 10 per cent loss.

Field beans yielded from 10 bushels to 24 bushels per acre according to variety and freedom from disease.

Turnips were considerably damaged by aphids. The total area was approximately nine and one quarter acres, with a gross yield of 95 tons 1,140 pounds. The yield varied in different areas from 17 tons per acre down to 9½ tons.

An acre and one-half of mangels yielded at the rate of 14 tons 1,868 pounds per acre. Field carrots gave a yield of 136 bushels per acre on one area and 380 bushels on another.

The hay yield from 36 acres was 73 tons 1,530 pounds.

Silage corn was practically a failure. Weather conditions prevented the early preparation of the land and seeding was delayed till the 12th of June. Fourteen acres were planted and the crop was cut and bound on the 8th and 9th October, after there had been some searing from frost. The yield after drying out somewhat in the field was 68 tons 370 pounds, and the silage was of poor quality; frost penetrated 18 inches from the walls of the stave silo. The varieties grown were White Cap, Yellow Dent and Wisconsin No. 7.

FERTILIZER EXPERIMENTS.

A new series of experiments comprising sixty-eight twentieth-acre plots was inaugurated with potatoes to test the effects of various combinations and quantities of nitrogen, phosphoric acid and potash compared with an application of one ton of a 4-8-10 mixture per acre. This experiment will be carried through a three-year rotation with oats in 1919 and clover hay in 1920. No field or garden experiments were conducted, the work planned having been concluded in 1917. No fresh work was undertaken on account of the special effort being made to grow field root seed.

CEREALS.

Variety tests with wheat, oats, barley and peas were continued with seven varieties of wheat, five of oats, six of barley and five of peas. The yields were almost double those of 1917. In wheat, Early Red Fife gave the best yield with 30 bushels per acre. In oats, Victory led with 45 bushels per acre. The new barley "Stella," bred at the Central Experimental Farm, was the best variety of that grain with 35 bushels per acre. Peas were badly damaged by the wet weather in September and 14 bushels of a very soft sample was the best yield; Arthur and Brittany standing equal.

FORAGE CROPS.

No variety tests were conducted and the field crops have been reported on under Field Husbandry.

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A considerable acreage of turnip stecklings was grown in the autumn of 1917, but they did not winter well and only three acres of seed plants were set. Those that wintered in the field came through well until April, but that month brought bright, warm days with freezing nights which destroyed a large proportion of the roots. On account of the wet weather in September, there was difficulty in getting the seed dried for threshing. Nine hundred and twenty-five pounds of a good sample was recovered. The variety grown was Sutton's Champion. Twelve acres of turnip stecklings were grown and stored in cellar and pits for seeding in 1919.

FLAX.

A half acre of flax was grown for fibre and a good sample was obtained and shipped to the Central Experimental Farm for fibre test.

HORTICULTURE.

Large Fruits.—The apple orchards continue to make good progress. The majority of the trees came through the winter in good condition and made strong wood growth during the summer. A few trees in the variety orchard were broken with snow. Some of the earlier varieties of apples bore their first fruit in 1918. Pears, plums, and cherries suffered considerably from winter-killing. No fruit was produced in this orchard this season although considerable bloom was shown.

Bush and Small Fruits.—The bush fruit plantation gave very disappointing returns, red and white currants and gooseberries bore practically no fruit and the black currants gave only a fair yield. No results were obtained from the strawberry plantation as nearly all the plants were killed when the straw covering was accidentally burned in the early spring. The vineyard is making good progress and only a few vines have died. One or two varieties bore a small quantity of fruit during the season but it did not mature.

Vegetables.—Variety tests of vegetables were discontinued in 1918 and the most of our attention given to the production of vegetable seed. Fortieth-acre plots of spinach, radish, carrots, beets, parsnips, onions and cabbage; a half-acre plot of peas and an eightieth-acre plot of celery were grown for this purpose. All of the annual vegetables produced seed in abundance but the very unfavourable weather that prevailed at harvesting time materially reduced the yield and in the case of the peas, ruined the entire crop. The biennial vegetables are being carried through for seed production in 1919.

Potatoes.—Experimental work with this crop was continued along the lines of previous years and crops of Green Mountain, Irish Cobbler and Improved Burbank were grown for seed distribution. A total of $13\frac{1}{2}$ acres was planted to potatoes, excluding $2\frac{1}{4}$ acres devoted to variety, disease and spraying tests, the yield from the remaining $11\frac{1}{4}$ acres was 2,472 bushels of which 2,295 bushels were marketable. The per acre yield was $21\frac{1}{2}$ bushels.

On the acre devoted to a test of cost of production, the yield was 288 $\frac{3}{4}$ bushels of marketable tubers and 9 $\frac{3}{4}$ bushels small. The cost was \$118.07, the value of the crop at current price when dug (3 per barrel) was \$317.62.

In conjunction with the Entomological Branch, an extensive test of insecticides was made in combined sprays. The average per acre yield from 24 Bordeaux plots where the foliage was not injured was 41 bushels. The average per acre yield of 8 check plots was 238 bushels. Dust spraying gave 419 bushels per acre. On the plot

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where potassium sulphide was used in the spray, the yield was 484 bushels per acre, leading to the suspicion that potash may be absorbed into the circulation of the plant from the spray.

The season was not favourable to large yields of potatoes and on check plots and areas not sprayed there was a great deal of late blight. The general use of arsenate of lime as an insecticide was very satisfactory.

Flowers.—The usual variety and cultural tests of annuals, perennials and bulbs were carried out and the general display of flowers was as popular as ever.

FARM IMPROVEMENTS.

A root cellar was built for the storage of roots for seed growing and to take the surplus field and garden roots, etc. The dimensions are 25 feet by 50 feet with stone walls and cedar top covered with two feet of earth. This cellar has a driveway through it and provided most satisfactory storage for stecklings, there being practically no loss when the roots were spread about 15 inches deep on the floor. The cost of this cellar was \$1,050.

CLEARING LAND.

Very considerable work was done in blowing and removing boulders and stones from various fields. Stumps were removed, piled and burned on five acres of new land. Bushes were cut and burned on some thirty acres of pasture land.

DRAINING.

Tile drains were laid under five acres.

EXHIBITIONS.

Exhibits were made at the Charlotte County Exhibition, St. Stephen, N.B., at the Potatoe Growers' Convention and Show at Woodstock and at the Provincial Seed Fair at Fredericton. Applications were received at these shows for seed samples and considerable literature distributed.

MEETINGS ATTENDED.

The superintendent and assistant to the superintendent attended and gave addresses at the exhibitions and at a few other meetings in the province.

EXCURSIONS.

The Farmers and Dairymens' Association of New Brunswick conducted an excursion to the Station on the 14th March, when two hundred and twenty-five delegates from all parts of the province were in attendance. After a general inspection of the stables and various farm departments lunch was served and addresses then given by the Acting Director and the superintendents of the Experimental Stations at Kentville, Nappan and Fredericton and the assistant to the superintendent of the Fredericton Station. Live stock judging demonstrations were conducted with both horses and cattle.

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EXPERIMENTAL STATION, STE. ANNE DE LA POCATIERE, QUE.

REPORT OF THE SUPERINTENDENT, JOSEPH BEGIN.

CHARACTER OF SEASON.

The winter of 1917-18 was the most severe that has been experienced in a number of years. April, however, opened up fine and dry, the snow melting so gradually that not even the most exposed of the land was flooded. The soil, however, remained frozen until the last of the month, so that no seeding was done, except on a piece of well-drained land, towards the last of April. May was so rainy that not until the 18th did seeding operations begin in general in the district. The usual precipitation was doubled during May, June and July, thus seriously hindering germination and proper growth. August was very dry. The hay crop, which was average, was harvested in good condition, but, September being rainy, the grain was harvested with difficulty. The end of autumn, however, was very favourable for the harvesting of the crop of potatoes. The winter of 1918-19 was remarkable as to the heavy fall of snow throughout the season, and, on March 31, the fields throughout the district were still covered with snow.

METEOROLOGICAL RECORDS.

Month.	Temperature.					Precipitation.			No. of Days.		Sun-shine.
	Date.	Max.	Date.	Min.	Mean.	Rain.	Snow.	Total.	Rain.	Snow.	
1918.						Inches.	Inches.	Inches.			Hours.
January	27	65.4	6	24.4	38.2	1.25		1.25			236.5
February	2	80.4	18	30.0	44.2	4.14	1	5.24	11	1	208.8
March	2	81.4	18	30.0	44.8	5.1		5.13	12		224.7
April	28	87.4	8	38.8	59.7	6.73		6.73	14		217.1
May	22	81.4	16	35.0	58.7	1.01		1.01	7		242.4
June	4	74.2	27	32.8	47.8	6.88		6.88	20		124.6
July	10	80.7	22	31.0	45.1	0.76	1	1.76	5	1	122.2
August	3	74.2	2	38.8	47.8	0.73	7	1.22	6		77.1
September	22	72.4	7	-4.2	16.0	0.8		0.8	7		74.7
1919.											
January	1	8.2	11	-23.8	12.6		31	3.10			82.6
February	1	4.7	12	-4.3	17.7		22	2.20			144.8
March	10	32.2	15	3.1	24.0	0.7		3.65			130.6
Totals.....							103	36.63	87	11	864.1

LIVESTOCK.

Horses.—Fourteen draught horses, two colts two years old and one filly one year old were wintered at the Station. Four draught horses, not suitable to raise, were sold the previous fall. Eight good mares, weighing from 1,550 to 1,750 pounds, of which five are registered Percherons of high breeding, are kept on the Farm for a dual purpose: for work and for breeding purposes. The total number of hours of work of the above-mentioned horses was 30,782 hours or an average of 1,710 hours per horse or a daily average of 5.7 hours per horse. This average, taken as a whole, would mean a daily average of 6.6 hours per horse for the horses which worked all year. Two mares foaled in a period of 172 and 180 days respectively. It is thought better that the mare's work be sacrificed to the raising of the colt.

Cost of Raising Colts.—A Percheron colt born on the 12th of February, 1917, consumed the following feed from April 1, 1918, to March 21, 1919: oats, 4,965 pounds.

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bran, 461 pounds, hay, 4,042 pounds, roots, 585 pounds, and pasturage for 4 months at \$2 per month. The price of the above may be reckoned from the following: Grain, 1½c., roots, \$2 per ton, hay, \$7 per ton, and straw, \$4 per ton. At these figures, the total cost of feed amounts to \$92.75. Increases in the weight of this colt are here shown: April 1, 1918, 1,175 pounds, June 30, 1,280 pounds, September 30, 1,415 pounds, December 31, 1,510 pounds, and March 31 1919, 1,625 pounds. The colt was wintered out-of-doors, having a shed 15 feet x 18 feet with an opening to the south. This method of wintering, little known in this section, attracts the attention of many visitors. The apparent comfort, the regular development and vigorous growth tend to show that this method is advantageous in the raising of colts. However, wintered out-of-doors, a colt is bound to consume more, especially grain, but the surplus expense is largely compensated for by the remarkable vigour of the animal. The total cost of maintenance, at the prices above mentioned, amounts to \$155.86.

A Percheron filly, born April 11, 1917, cost \$128.32 to the end of March, 1919, a total time of 719 days. The feed consumed by this filly for the past year was: Oats, 3,143 pounds, bran, 538 pounds, mixed hay, 3,939 pounds, 4 months' pasture at \$2 per month, roots, 536 pounds and straw for bedding, 1,095 pounds. The total cost was \$69.99. This filly was wintered in the stable. Its weight on April 1, 1918, was 1,125 pounds, while on March 31, 1919, it weighed 1,560 pounds. It is to be noted that the increase of the weight of the filly was 335 pounds as compared with that of the colt at 450 pounds, during the same period. The food consumed was the same in quality and quantity except that the colt wintered out-of-doors had 1,822 pounds of grain more, which is explained by the fact that the colt, being out-of-doors and having more exercise, could assimilate the greater quantity required for its nourishment.

Cattle.—The cattle at the Station consist of 33 head of pure bred registered Ayrshires comprised as follows: 1 very good herd-bull, 5 bull calves one year old, 14 milch cows, 8 yearling heifers, and 5 of this year. The grade herd consists of 5 old cows, 5 of three and four years of age, of first blood Ayrshires, 4 heifers of one and two years, 5 heifers of this year and two of this year second blood Ayrshires, making a total herd, grade and pure, of 54 animals. Nine young Ayrshire herd-bulls from 4 to 11 months old were sold to breeders and breeders' associations in this district. Two adult Ayrshire cows and three grade cows were also sold during the year. 26 cows, 19 adult and 7 young, in their first period of lactation stopped milking during the year. The average length of the lactation period of the herd was 303 days. The total amount of milk for the year was 136,069 pounds; the average in butter fat was 4.01654 and the total production of butter was 6,429.72 pounds. The total cost of feeding the cows during their lactation was \$1,455.50 considering which, the cost per hundred of milk would be \$1.06983 and of 1 pound of butter, \$0.2264.

Swine.—A good boar and 6 sows, Yorkshires, are kept on this Station. Some good young sows will be added to these. At present, the total number is 29, of which 6 sows are due in April and May. Five young boars were sold to breeders in the course of the past year, as well as 36 pigs for the market, the latter realizing a total of \$1,386.64. Particularly unfavourable circumstances have prevented any experiments in feeding during the year.

Sheep.—A Shropshire herd is in the process of formation, at the same time as a gradual improvement is being made by the use of a good Shropshire ram. At present there are two good rams, 28 ewes pure blood and first blood Shropshire, and 22 lambs.

POULTRY.

Experimental work in agriculture during the past year was somewhat disorganized owing to the scarcity of help and the cost of feed. The damp, cold weather of the season was also a serious obstacle to obtaining the best results. 36 White

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Wyandotte hens and 50 pullets, and 40 Barred Rock hens and 46 pullets were wintered at the Station. The season was one of the most unfavourable for the production of eggs and the raising of chickens. The total number of birds sent to the market was 115, with a weight of 527 pounds and selling for \$173.91. 12,967 eggs were produced at the Station during the year.

Bees.—The bees kept at this Station are Native Blacks and Italian Hybrids. Of the eighty colonies which were wintered in the cellar, 2 were lost, possibly owing to the lack of sufficient population in the hive. Eight colonies in wintering cases came out strong in the spring. The season being late, cold and rainy, the bees were unable to obtain as much nourishment as in previous years. Although the season was short, the production was very good, but possibly 40 per cent of the production was lost. However, although the season was practically ended by the first of August, an average of 95 pounds per colony was realized, the greatest production for one colony being 225 pounds.

FIELD HUSBANDRY.

Rotations.—Four rotations of three, four and five years were carried on during the year, the four-year rotation being in duplicate on land of the same nature, except that one parcel was well-drained and the other was not drained. The three rotations produced crops permitting the proper products to be grown for milk production and the raising of young stock on the Farm. The 3-year rotation is mainly for small farms where the natural pasture permits the increase of livestock, but, although yielding heavier crops, it requires more work. This rotation is generally adopted on many eastern farms. The 4-year rotation permits the improvement of the farm and is intended for those desiring greater cereal crops.

Cereal Crops.—On the regular rotations, the average yields were as follows:—

	Bushels.	Pounds.
Huron wheat.. . . .	44	56
Marquis wheat.. . . .	43	4
Ruby wheat.. . . .	38	28
Banner oats.. . . .	72	10
Daubeney Oats.. . . .	67	4
Ligowo oats.. . . .	69	18
Manchurian barley.. . . .	42	12
Albert barley.. . . .	38	18
No. 80 (Charl.) barley.. . . .	38	10
Albert barley.. . . .	35	15
Arthur peas.. . . .	30	22

Forage Plants.—Difficulty in procuring seed hindered the usual tests being continued in maize and forage crops during the year.

HORTICULTURE.

Forced by unfavourable circumstances, the greater part of the experiments and tests of varieties were suspended for the past year. A certain quantity of vegetables was grown with a view to determine the cost of production of the seed. The potato crop yielded about 326 bushels per acre, of which 284 bushels were saleable. This is a good record, considering the unfavourable conditions in this district last year for the culture of potatoes.

Orchards.—The past season is a record one with regards to the disastrous results in the orchard, especially in the culture of European plums. It is estimated that about 52 per cent of the plum crop was destroyed, 80 per cent of the pears, 20 per cent of the cherries and about 5 per cent of the apples. The plum crop was practically nothing, the apples about a 60 per cent average and the small fruits only a half crop.

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Hedges.—A hedge of 640 rods, running around the north and west sides of the orchard, was planted in the autumn of 1917 to serve mainly as a wind-break for the orchard. It consists of fir trees planted at intervals of five feet as a permanent hedge, with Lombardy poplars also as a temporary wind-break. Flowers were also planted on each side of the hedge and formed a centre of attraction for many visitors. A large quantity of the seeds, perfectly ripened, were gathered in good condition.

SPECIAL CROPS.

Twenty-five acres, sown for the production of stecklings, gave a good yield, at an average of about 14 tons to the acre. An acre of flax was cultivated for fibre, yielding 3,850 pounds, which was sent to Ottawa.

IMPROVEMENTS, ETC.

The calf barn, started in 1917, was completed with all modern accommodations, including ten stalls for calves and young stock, one large stall for two young calves, and a granary, the upper part being large enough to hold considerable forage. Some thousands of feet of drain were laid to improve a certain field. Considerable fencing was done as well as a number of stone taken off the fields and used in improving the roads. Exhibitions were held and at these a strong impression was left regarding the demonstrations of the Farm, the methods of culture and the advantages gained thereby.

VISITORS.

No less than 6,500 farmers from the East visited the Station during the year. Three Agricultural Days were held during the year, at which hundreds of farmers were present. Excursions of considerable interest and importance were also held during the fine season.

EXPERIMENTAL STATION, CAP ROUGE, QUE.**REPORT OF THE SUPERINTENDENT, G. A. LANGEЛИER.**

CHARACTER OF THE SEASON.

The six months during which plants make their growth in Central Quebec were a little colder and brighter, but much wetter than the average for the last seven years, the mean temperature being respectively 55.87 and 56.27° F., the number of hours of sunshine 1,096.9 and 1,074.3, the precipitation 34.01 and 25.92 inches. The frost-free season was shorter than usual, being only 129 days, from May 5 to September 11.

The following were very good: hay, garden roots, early peas and beans, whilst early potatoes, oats, barley, wheat, onions, celery, cucumbers, lettuce, strawberries, currants, gooseberries, perennials, ornamental plants and bushes were good, sweet corn, cabbage, late potatoes, melons, squash, apples, cherries, grapes, raspberries, annual ornamental plants were medium, and corn for silage, swedes, late beans and peas, tomatoes, plums and pears were poor crops.

METEOROLOGICAL RECORDS, 1918-19.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 hours.	
1918.				Inches.	Inches.	Inches.	Inches.	Hours.
April	68.0	14.2	52.48	1.92		1.92	0.67	220.3
May	83.0	30.2	53.52	4.33		4.33	0.77	181.9
June	82.0	34.2	56.76	6.77		6.77	1.90	210.9
July	88.0	46.2	66.69	6.96		6.96	2.74	201.0
August	83.0	30.2	62.64	2.90		2.90	1.08	209.1
September	79.0	30.2	51.79	9.52		9.52	1.66	118.1
October	61.0	26.2	43.83	3.53		3.53	0.84	115.9
November	53.0	9.2	32.30	1.82	7.40	2.56	0.50	64.4
December	40.0	- 5.1	18.47	2.37	21.90	4.56	0.95	47.2
1919.								
January	37.0	-19.9	13.02	0.20	33.10	3.51	0.80	45.9
February	34.0	- 7.0	16.88		22.50	2.25	1.20	107.5
March	49.0	-10.0	24.82	2.15	29.00	5.05	1.20	113.2
				42.47	113.90	53.86		1,007.4

LIVE STOCK.

In general, the live stock kept in very good condition throughout the year.

DAIRY CATTLE.

The herd numbered 47 head on March 31, 1919, 43 of which were pure-bred and 4 grade French Canadians. They are kept for five purposes: supplying milk to the dairy, experimental breeding, experimental feeding, experimental housing, and distributing high-class breeders at reasonable prices.

Milk Production.—Thirteen heifers and cows, ranging in age from 2 to 12, finished a lactation period during the fiscal year. Their average production was 5,952 pounds of milk, testing 4.2, which is equivalent to about 300 pounds of butter per animal per year. One young cow gave more than 500 pounds of butter, and the three best ones over 475 pounds each, which shows that when the “boarders” are all weeded out the average for the herd will rise considerably.

EXPERIMENTAL BREEDING.

Grading Up a Dairy Herd.

Project No. 1.—The object of this experiment was to find out if heifers out of grade cows, by a pure bred bull, would be better milkers than their dams. It was started in 1911 and not a heifer has been good enough to keep in the herd, the probable reason of this being that the sire used was out of a low producer. This means that a farmer who wishes to improve a dairy herd must get something besides a pedigree.

EXPERIMENTAL FEEDING.

Work was continued on the three following projects: Whole milk vs. skim milk and supplements for calves, feed requirements of heifers until calving time, extra good vs. average rearing of heifers as influencing size, type also production of the mature cow.

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Whole Milk vs. Skim Milk and Supplements for Calves.

Project No. 3.—Three lots of calves were fed differently until twenty-four weeks of age, one bunch receiving whole milk, the second skim milk and commercial calf meal, and the last skim milk and home mixed calf meal, consisting of 6 parts corn, 3 parts oats, 1½ parts flax seed, by weight, all ground together. Calculating whole milk at \$2, skim milk at 25 cents, home mixed calf meal, also commercial calf meal, at \$5 per 100 pounds, bran at \$40 per ton, hay at \$15, silage and roots at \$4, it cost \$49.31 for each of the skim milk calves, \$16.45 for each of the commercial meal calves and \$16.33 for each of the home mixed meal calves. This experiment will be continued, but the results, to date, show that whole milk is much too costly, also that the home mixture is as good as the commercial calf meal.

Feed Requirements of Heifers until Calving.

Project No. 4.—Everything given to six heifers was weighed until they calved, when their age averaged 25 months 20 days, their weight 777 pounds, and their feed 692 pounds whole milk, 5,993 pounds skim milk, 736 pounds meal, 2,902 pounds hay, 177 pounds green stuff, 4,326 pounds roots, 5,660 pounds silage, besides 97 days at pasture. Valuating the whole milk at 2 cents per pound, the skim milk at 25 cents per 100 pounds, the meal at 2 cents per pound, the hay at \$15 per ton, the green stuff at \$6 per ton, the roots and the silage at \$4 per ton, the pasture at \$2 per head per month, it cost \$92.23 for feed only to keep each of these heifers until calving time.

Extra Good vs. Average Rearing of Heifers.

Project No. 5.—So that breeding would not influence results, twins were chosen for this experiment. One of them was fed as she probably would have been on the average farmer's place, whilst the other was kept fat all the time. It will, of course, take a few years before conclusions can be arrived at, and other heifers will have to go through the same experiment. But as far as weight is concerned, it can be said that, at 34 months of age, it was about the same for each, the one which had been kept thin having picked up considerably since both of them, after calving, were fed a full ration.

EXPERIMENTAL HOUSING.

Keeping cattle in single boarded sheds.

Project No 6.—Cows giving milk, and young calves, should be kept in moderately warm buildings, but all other cattle may be wintered outside with single boarded sheds as shelters. Since 1915, three bulls have been kept this way all the year around, and during the winter of 1918-19, two heifers had the same treatment, being only brought in a short while before calving. Every one of these animals has remained in the very best of health.

SELLING BREEDERS AT REASONABLE PRICES.

There are more French Canadian cows and heifers which have qualified for the Record of Performance, at the Cap Rouge Station, than in any other herd. The three bulls are out of dams which have this distinction, and calves from such stock, sold at reasonable prices, should certainly be a benefit to farmers of the district.

HORSES.

There are now 27 horses, including 22 registered French Canadians. They are kept for five purposes: work on the farm, experimental breeding, experimental feeding, experimental housing, and to distribute high class breeders.

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Work on the Farm.

During the year, each horse averaged 1,920 hours of work, leaving aside, of course, the unbroken colts. As nine mares had foals, this is fairly good. With feed and manual labour at present prices, the cost of horse work, per hour, is now extremely high, unless farming operations are planned in such a way that animals are worked as many days as possible through the year. In general, nearly one-fourth of each farm is devoted to growing feed for horses.

EXPERIMENTAL BREEDING.

There are three investigations: close breeding, raising fall colts, work vs. no work for brood mares.

Close Breeding.

Project No. 7.—A mare and her son, dropped at the station, were used for this experiment. Though both are in perfect health, the three youngsters born from this mating died, one at about twelve months, another at twenty-one months, and the third at three months. It may be possible that the mare and the sire of her son were inbred themselves, which would be very close breeding for the colts dropped at the station, and this project will be continued with another mare and her son.

Raising Fall Colts.

Project No. 8.—If mares dropped their foals in the autumn, they would wean them in the spring and thus could do much more work during the cropping season. This is the main reason which prompted this experiment. Two fall colts were dropped and raised in box stalls, as there could be no question of wintering these youngsters outside. At first, probably on account of the close confinement in the stable, they did not seem to thrive well, but they got over this and have developed as well as the others. It must, however, be admitted that mares do not always come in heat in the autumn and that they are then harder to *settle* than in the spring.

Work vs. no work for brood mares.

Project No. 9.—The same mare was bred four years running and was subjected to different ways of exercising. Two winters, she was worked reasonably all the time until foaling; another, she was turned outside with only a single boarded shed for a shelter; and the next she was kept in a box-stall, without work, but turned out often for exercise. As she raised a fine filly each year, it shows that if exercise is essential for the brood mare, the mode of exercising is not of importance, as long as judgment is used.

EXPERIMENTAL FEEDING.

The two experiments relate to the quantity of feed necessary to rear a young animal until he is ready to earn his living, and to the quantity of feed required during a year by a work horse.

Feed Required to Raise Horses.

Project No. 10.—All feed given to a colt and to four fillies was weighed until they were broken to harness, when their age averaged 34 months and 9 days, their weight, 1,296 pounds, and their feeds, 17 pounds whole milk, 621 pounds skim milk, 17 pounds wheat, 3 pounds oil meal, 11,403 pounds hay, 3,672 pounds oats, 4,203 pounds bran, besides six months on a poor pasture. Calculating the above feeds at the following prices: whole milk \$2, skim milk 25 cents, wheat \$3, oil meal \$3, oats \$2.75, bran \$2 per 100 pounds, hay \$15 per ton, pasture \$2 per head per month, it cost over \$225.00 for each of them for feed alone. When service fee, loss of time by the dam, barn or shed room, bedding, care, and risks of accidents or deaths are added to the above, it is clear that only good horses should be raised if they are to be profitable.

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Feed requirements of work horses.

Project No. 11.—All the feed of two working horses was weighed during a year and it was found out that it cost \$206.93 for each of them, whose average weight was 1,214 pounds, calculating hay at \$15 per ton, oats at 2 $\frac{3}{4}$ cents, bran at 2 cents, and molasses at 4 cents per pound. As horses do not, on the average farm, work more than five hours during 300 days, per year, the cost is very high per hour per horse, just for feed, besides interest, depreciation, risks of accidents and death, veterinary services, barn room, bedding, care, harness, blankets, halters, etc. One of the best ways to have cheaper horse labour is to use only strong, healthy animals and so to plan the work that they are employed the greatest number of hours possible, through the year.

EXPERIMENTAL HOUSING.

Raising horses in single-boarded sheds.

Project No. 12.—All colts are raised in single-boarded sheds at Cap Rouge. They leave the barn, with their dam, when a few days old and only go back when they are broken and worked on the Farm. The doors on the sheds are open all the year around, day and night, except perhaps half a dozen times during heavy sleet, in winter. Though nineteen different young horses were wintered thus, and the temperature went down as low as 34° F. below zero, never was one seen to shiver. They keep in the pink of health, often commence to shed their hair earlier than those kept inside, and have strong, clean limbs, due to exercise. Theoretically, it should take more feed to keep up the warmth of their bodies, but it is a question if this is so, because all that is eaten is digested and assimilated, whilst in a badly ventilated stable, digestion is certainly not so good.

SELLING BREEDERS AT REASONABLE PRICES.

The stud of French Canadian horses at Cap Rouge is admitted by everybody to be the best in existence to-day. Farmers are taking advantage of the reasonable prices at which colts are sold and these generally go as weanlings. In 1918, three were shipped to Ontario and one to Nova Scotia.

SHEEP.

On March 31, 1919, the flock comprised three stud rams, twenty-eight breeding ewes, six shearling ewes, and twenty-six lambs, a total of sixty-three, all pure-bred Leicesters. They are kept for experimental feeding, experimental housing, and to sell breeders at reasonable prices.

EXPERIMENTAL FEEDING.

Feed required to winter a breeding ewe.

Project No. 13.—This investigation is to find out how much feed it takes to winter a breeding ewe, as this is, no doubt, one of the main items in the cost of production of lambs. Calculating hay at \$15 per ton, pea straw at \$5, swedes at \$4, oats at 2 $\frac{3}{4}$ cents per pound and bran at 2 cents, it has cost, on an average, \$12.64 to carry a breeding ewe during two hundred days, from the beginning of November to about the middle of May.

EXPERIMENTAL HOUSING.

Raising lambs in single-boarded sheds.

Project No. 14.—The ewes are wintered in single-boarded sheds, with an open front facing south. When they are due early, they are brought down to the sheep barn a few days before lambing, but as soon as the youngsters are about a week old, a day or so after they have been docked and ear marked, they are sent back to the shed

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with their dams. Only one lamb, and he was a triplet, out of 33, was lost in 1919, so that this treatment cannot be very hard on them. Pure air, though cold, is much better than warm air when vitiated.

SELLING BREEDERS AT REASONABLE PRICES.

A strong-constituted flock is kept at Cap Rouge and two of the rams used were bred at the Station from a strain of prolific, heavy milking ewes, two quite important points in the raising of good sheep. Farmers of the district take advantage of the reasonable prices and there has never been any trouble to dispose of the rams, over \$500 worth being sold during 1918 for breeding purposes.

POULTRY.

Barred Rocks exclusively are kept for experimental breeding, experimental feeding, experimental housing, and to distribute good stock. Experimental work is also done in regards to the best means of preserving eggs. Though about three hundred hens and pullets were wintered in 1918-19, a great number were sold after the incubation season, so that the average number kept during all the year was 187. They laid 14,803 eggs or about 80 per hen.

EXPERIMENTAL BREEDING.

This consisted in comparing the profitableness of layers of different ages.

Layers of Different Ages.

Project No. 84.—Four pens of about twenty-five birds each were used during the months of November, December, January, February, four years in succession. If the cost of production of one dozen of egg is taken as 100 for early pullets, hatched before May, then it would be represented by 290 for late pullets, hatched after April, by 356 for yearling hens and by 1,452 for old hens. The cost was about 30 cents per dozen for early pullets, \$1.13 for late pullets, \$1.38 for yearling hens, and \$5.65 for old hens.

EXPERIMENTAL FEEDING.

There are four experiments to compare different kinds of feeds and watering: skim milk vs beef scraps, commercial grain vs screenings, roots vs clover leaves, water vs snow.

Skim Milk vs. Beef Scraps.

Project No. 81.—This experiment was made during November, December, January and February, three years in succession. Twenty pullets were in each pen and both lots were fed alike with the exception that one received skim milk and the other beef scraps. The birds receiving skim milk laid much better and took on a little more weight than those getting beef scraps. If the profit from the first lot is taken as 100, that from the second would be only 9. As 12.66 pounds of skim milk were fed for each pound of beef scraps, then 100 pounds of the latter were only equivalent to 114 pounds of the former.

Commercial Grain vs. Screenings.

Project No. 79.—This experiment ran three years, during November, December, January and February. An average of twenty-four birds were in each pen and were fed alike, of roots, animal food, meal, grit, shells, but one lot received commercial grain and the other screenings. When these screenings were such as would be taken from the fanning mill by a farmer who thoroughly cleans his grain for seed, they were

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worth about $\frac{2}{3}$ of commercial grain, but when they were elevator screenings from the West, containing a lot of wild buckwheat and other seeds, it took about eleven pounds to give as good results as one pound of commercial grain. This experiment will be continued during two more years and it is advisable to wait further results before forming a decided opinion on the subject.

Roots vs. Clover.

Project No. 80.—This experiment has been running three years, during November, December, January and February. An average of about twenty-two birds were in each pen and both lots were fed alike with the exception that one received swede turnips and the other dry clover leaves. The birds receiving dry clover leaves laid better and took on more weight than those getting swede turnips. If the profit from the former is taken as 100, that from the latter lot would be only 38. As 2.03 pounds of swede turnips were fed for each pound of dry leaves, then 100 pounds of the latter were equal to 534 pounds of the former.

Water vs. Snow.

Project No. 82.—For three years, this experiment was conducted during November, December, January and February. An average of about twenty-one birds were in each pen. Both lots were fed practically the same, with the exception that one received water whilst the other got snow as soon as it came and then all winter. The cost per dozen of eggs was not greater for the birds receiving snow, but this lot did not gain as much weight as the other. The conclusion, to date, is that water is better, but not so much so that a farmer who cannot, or does not want to give it, should not keep poultry.

EXPERIMENTAL HOUSING.

Project No. 83.—The highest and lowest temperature were taken each day, during the months of November, December, January and February, for four years, outside, in a colony 8 feet wide, in a laying house 12 feet wide, and in another 16 feet wide. All styles of buildings were of the ordinary shed roof pattern, had twice the area of cotton as of glass, and were placed so as to get about the same amount of sun and wind. The range of temperature, that is the difference between the highest and the lowest, during all that time, averaged 37.5 degrees outside, 26.6 in the colony, 25.4 in the narrow house, and 24.0 in the wide one.

DISTRIBUTING GOOD STOCK.

Over 2,000 eggs, and fifteen birds, were given to other Stations and to members of survey work. Besides this, eggs, chicks and breeding stock were sold at prices current in the district. In every case, the very best only is sent out, the rest being disposed of for consumption.

EGG PRESERVATIVES.

Project No. 78.—For three years, different methods of keeping eggs were tried, such as wrapping in paper and leaving alone, wrapping in paper and turning daily, putting away in oats, in sawdust, in lime water, in water-glass. Samples were tested at the Chemistry Division, Central Experimental Farm, Ottawa, and at the Cap Rouge Station. Only lime water and water-glass have given satisfaction. That eggs can thus be well preserved is shown by what the Dominion Chemist wrote about eggs preserved in June, 1918 and tested in February or March 1919: "It may be said in conclusion that these eggs were as fine as any preserved eggs we have examined."

BEES.

The bees, at Cap Rouge, are hybrids between Blacks and Italians. They are kept for commercial and experimental work.

PRODUCTION OF HONEY.

In 1918, twelve colonies averaged 68 pounds of honey which sold for \$13.65, the greatest yield from one being 184 pounds. Deducting the sugar fed, each colony netted \$13.21. It is thought that 86 per cent of the above honey was from white and alsike clover, whilst 14 per cent came from weed flowers.

EXPERIMENTAL WORK.

Comparison of different stores for wintering.

Project No. 16.—Some colonies are fed early-gathered honey, others late-gathered honey, others early-gathered honey and sugar syrup, and others only sugar syrup. The average, to-date, shows that those fed early-gathered honey lost 17 pounds in weight during the winter, those fed late-gathered honey lost 22 pounds, those fed early-gathered honey and sugar syrup lost 18 pounds, and those fed only sugar syrup lost 11 pounds. As to the condition of the bees, in the spring, there was not much difference, but it is certainly better to wait the results of a few more winters before coming to conclusions.

FIELD HUSBANDRY.

Work for this division comprises crop management, soil management, and agricultural engineering.

CROP MANAGEMENT.

Under this come crop yields, cost of production of field crops, rotations, and experimental work.

CROP YIELDS.

Project No. 36.—They were generally lower than usual, with the exception of hay, both in the district and at the station. At the latter place, grain was better than the average elsewhere, because most of the land is tile drained.

Crop.	Yield per Acre in Pounds.		
	1918.	Average.	For—
Longfellow corn...	9,472	16,175	7 years.
Good Luck Swedes.	15,189	27,887	7 "
Timothy hay	4,452	3,489	7 "
Clover hay...	4,809	4,124	7 "
Burner oats	1,695	1,584	7 "
Manchurian barley...	1,077	1,127	5 "
Huron wheat...	1,624	1,624	4 "
Arthur peas	1,765	1,742	4 "

COST OF PRODUCTION OF FIELD CROPS.

Project No. 37. Since 1913 inclusive, accurate records have been kept on eighty-eight acres, for the three main crops of the district, swede turnips, oats, and hay, with the following results:—

	1918.		Average for Six Years.	
	Yield per Acre.		Yield per Acre.	
	Lbs.	Cost.	Lbs.	Cost.
Good Luck Swedes...	15,189	\$5 78 per ton.	27,146	\$3 13 per ton.
Burner oats	1,654	0 55 per bushel.	1,890	0 37 per bushel.
Timothy and clover hay	4,452	6 64 per ton.	4,571	5 89 per ton.

It is interesting to note how an increase in yield lowers the cost per acre, and vice versa.

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ROTATIONS.

Project No. 43.—A three, a four, and a six-year rotation have now been compared for eight years. Each has a hoed crop, followed by oats and then by hay for one, two or four years. Contrary to expectations, the long rotation has given more profit per acre, per year, than the short one which was a little ahead of the four-year.

EXPERIMENTAL WORK.

This consisted in comparing different rates of seeding oats, also of seeding timothy, red clover and alsike, in recording the yield of hay when the nurse crop had been sown at different rates, also the yield of hay after different kinds of grain.

Rates of seeding oats.

Project No. 38.—Thirteen different rates, going up by a quarter of a bushel from 1 to 4 inclusive, were tried during five years, from 1913 to 1917 inclusive. In 1918, the six rates which had averaged the highest were on test with the following results, the amount of seed being deducted in each case from the total yield, leaving the net yield: $1\frac{3}{4}$ bushel of seed gave 57 bushels and 27 pounds; $2\frac{1}{2}$ bushels, 60 bushels 16 pounds; $2\frac{3}{4}$ bushels, 58 bushels 14 pounds; 3 bushels, 58 bushels 20 pounds; $3\frac{1}{4}$ bushels, 59 bushels 10 pounds; $3\frac{3}{4}$ bushels, 63 bushels 27 pounds. This was on a sandy loam of better than average fertility.

Rate of seeding timothy, red clover and alsike.

Project No. 39.—Since 1912 inclusive, 138 plots of one-sixtieth acre each were used for this experiment, on half of which 12 pounds timothy, 8 pounds red clover and 2 pounds alsike were sown per acre, with Banner oats as a nurse crop, whilst the others only received half of these quantities. The thick seeding gave 151 pounds more hay per acre, or only an increase of 4 per cent which shows that on a sandy loam of better than average fertility, kept in good tilth by a 3-year rotation, it is not as necessary to sow large quantities of grass and clover seed as it would be on a poor soil badly worked.

Yield of Clover Hay with different rates of sowing oats.

Project No. 41.—For six years, Banner oats were sown at thirteen different rates from 1 to 4 bushels per acre and the hay weighed the next season from each plot. If the average is taken as 100, then the crop of hay following the usual rate of $2\frac{1}{2}$ bushels of oats per acre would be represented by 89, whilst that following all rates below $2\frac{1}{2}$ bushels would be represented by 100 and that following all rates above $2\frac{1}{2}$ bushels would be represented by 116.

Yield of Clover hay with different kinds of nurse crops.

Project No. 40.—Since 1912, all the trial plots, 310 in number, were seeded down to timothy and clover. If the crop of hay after barley is taken as 100, that after wheat would be represented by 95, after oats by 88, and after peas by 64.

SOIL MANAGEMENT.

The only experiment going on is to find out if it is better to plough in the autumn or in the spring, for the production of ensilage corn, both as regards to cost of growing the crop and as to tonnage.

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Fall vs. spring ploughing for silage corn.

Project No. 42.—The average of two years shows that the actual cost of growing one ton of silage corn is greater when the ploughing is done in the spring. This is due mostly to the difference in yield, as if 100 is taken for the crop from the spring ploughed area, the one from the fall ploughed ground would be represented by 111. It should be noted that this is no small plot work, as all the corn grown on 17.98 acres was weighed.

AGRICULTURAL ENGINEERING.

On account of the scarcity of funds and of manual labour, not much could be done during 1918 at clearing land, draining, fencing and road making. However, nothing suffered and the most pressing needs were attended to.

CEREALS.

The work with cereals includes tests of varieties, the isolation of good strains, the growing of grain for hay, the comparison of different mixtures for grain, and an experiment in regard to what influences the cooking qualities of field peas.

VARIETY TESTS.

Thirty-three varieties of barley, flax, oats, peas and wheat were tried in 1918, all in duplicate, which necessitated sixty-six plots of one-sixtieth acre each.

Barley.

Project No. 23.—Since 1911, sixteen varieties or strains of two- and six-rowed barley were tried and nine of them were dropped because they did not yield enough. Manchurian seems the best adapted to this district. Its average production, for seven years, is 1,289 pounds of grain per acre, and it took 87 days to come to maturity.

Flax.

Project No. 25.—Two varieties, Longstem and Novelty, have been tested since 1915. The first one, which is more adapted to the production of fibre, averaged 560 pounds of grain per acre and took 107 days to mature, whilst the second averaged 765 pounds of grain per acre and took 111 days to mature.

Oats.

Project No. 26.—Thirteen varieties of oats have been tried for eight years and six of them have been left aside because they were low yielders. Banner is recommended as meeting very well the conditions of this part of Quebec. Its average production, for seven years, is 2,196 pounds of grain per acre and it took 104 days to come to maturity.

Peas.

Project No. 24.—Since 1911, twelve varieties or strains of field peas have been tried and seven of them were dropped because they did not yield enough. Arthur is the one which has shown the most consistency as a high producer, giving, for an average of seven years, 2,160 pounds of grain per acre and maturing in 98 days.

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Wheat.

Project No. 27.—Twenty varieties or strains of spring wheat have been tried for eight years and ten of them were left aside because they were low yielders. Huron has done the best of all those which have been on test for a reasonable time. Its average production, for eight years, is 1,353 pounds of grain and it took 101 days to mature.

ISOLATION OF GOOD STRAINS.

Selections of barley, oats, and wheat have been made for six years, with good results.

Manchurian Barley.

Project No. 19.—In 1914, a certain number of heads were chosen in the field crop and the grain from each was weighed. In 1915, the thirty best strains were kept, in 1916, the ten best, in 1917, the best, and in 1918 this strain was sown in the test plots, where it was the highest yielder, with Manchurian from Ottawa, but three days earlier than the latter.

Banner Oats.

Project No. 21.—In 1917, a number of heads were chosen in the field crop and in 1918 the same number of kernels from the ninety best were sown in as many different rows, with a check at both ends and at each fifth row. There was a difference of 67 per cent between the lowest and the highest yielding rows, and of 8 per cent between the general average and that of the best ten rows, grain from which will be sown in 1919.

Huron Wheat.

Project No. 22.—A number of heads were selected in 1913 from the field crop, where they did not seem to have had any special advantage in regards to soil or room. Since then, the best yielders were gradually cut down in number until one remained at the end of the season of 1917. In 1918, it was sown on duplicate plots, in the variety tests, where it was at the top, giving 36 per cent more grain than the other strain of Huron did in 1918, and 17 per cent more than the latter did for an average of eight years.

GROWING GRAIN FOR HAY.

Project No. 17.—The average of four years shows that when mixed hay from old meadows produced 4,797 pounds per acre, timothy 4,476, clover 4,584, hay from Banner oats gave 5,910, from Ligowo oats 6,495, from Gold Rain oats 7,335, from Victory oats 7,605, from Banner oats and Arthur peas 5,865, from Banner oats and vetches 6,705 pounds. Oats alone, of varieties yielding much hay, such as Victory and Gold Rain, give the largest quantity of digestible dry matter per acre, but vetches and oats, closely followed by the old mixture of peas and oats, furnish the most protein, which makes it fine hay to feed to dairy cattle, sheep and all young stock.

MIXTURES FOR GRAIN PRODUCTION.

Project No. 18.—In general, mixtures have not yielded as much per acre as the different grains sown alone. Out of thirteen different mixtures, eight have been discarded for the above reason, and work is continued with five, i.e., Banner oats and Premost flax, Banner oats and Duckbill barley, Banner oats and Arthur peas, Banner oats and Huron wheat, Banner oats, Duckbill barley and Huron wheat.

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COOKING QUALITIES OF FIELD PEAS.

Project No. 34.—Arthur peas were used for this experiment in 1917 when it was found out that, as an average, it took as long to cook peas whether they were grown on heavy or on light soil. The results of two years, however, show that if the time to cook peas grown after grain is 100, it would be represented by 162 for peas grown after a hoed crop, and by 231 for peas grown after grass. This experiment will be conducted a few years longer to gather more conclusive data.

FORAGE CROPS.

Investigations with forage crops consist in the testing of varieties, the selection of good strains, seed growing, and a comparison of different methods of helping the germination of mangel seed

VARIETY TESTS.

Nine varieties of carrots, mangels and swede turnips were tried in 1918, all in duplicate, on one-hundredth acre plots.

Carrots.

Project No. 45.—Since 1911, fourteen varieties of carrots have been tried and the Mammoth White Intermediate is at the head with an average yield, for seven years, of 16,231 pounds per acre.

Mangels.

Project No. 46.—Twenty varieties of mangels were tested since eight years with the result that Giant Half Sugar White was the heaviest yielder, giving 15,816 pounds for an average of six seasons.

Swede Turnips.

Project No. 53.—Since 1911, thirty-five varieties and strains of swede turnips have been tried, and Good Luck is easily the best of them all, with an average of 36,969 pounds per acre for eight years.

ISOLATION OF GOOD STRAINS.

Selections of alfalfa, corn, and swede turnips have been made for a few years.

Alfalfa.

Project No. 57.—A certain quantity of Grimm alfalfa was sown with the object of getting the hardier strains through natural selection, the others being winter-killed. A fairly well protected spot was chosen at first, where snow generally remains from early winter until late spring, but seed gathered from this patch will be sown on another area where very little snow stays, as this seed will come from plants which are being gradually acclimatized.

Corn.

Project No. 61.—A few years ago, good seed of Quebec Yellow was procured and fifty rows were sown with kernels from as many ears. After a careful examination through the growing season, it was decided to keep ears from sixteen rows and this number was cut down to five the following year. Out of these, four were the heaviest yielders and the other was the earliest. Grain from one of the heavy yielders was sown in rows alternating with others sown with the earliest, so that natural crosses might take place in the field. This strain has now been sent, per request, to the western provinces and even to England.

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Swede Turnips.

Project No. 58.—After finding out from the trial plots that Good Luck was the heaviest yielder, roots of different varieties tried here were sent to the Division of Chemistry, Ottawa, and it was also ascertained that this variety produced the largest quantity of dry matter per acre. Since then, roots containing the most dry matter, easily found by immersing in brine, are used as seed bearers to increase the dry matter content of this variety. Soon, individual roots of special merit will be used to grow seed under small tents, to prevent crossing, so as to isolate the very best.

SEED GROWING.

A certain quantity of Quebec Yellow corn and of Good Luck swede seed is grown each year for distribution to farmers of the district who can thus start with very good strains well acclimatized to this part of Quebec.

HELPING THE GERMINATION OF MANGEL SEED.

Project No. 55.—The results of nine different tests made in flats in the greenhouse show that if the check is taken at 100, packing the soil would give a germination of 99; watering each day, of 97; packing the soil and watering, of 99; applying a complete fertilizer in the row with the seed, of 48; mixing a complete fertilizer with the soil as in harrowing, of 85; applying salt in the row with the seed, of 12; mixing salt with the soil as in harrowing, of 47; soaking seed in water for 15 hours, of 104; soaking seed in a mixture of liquid manure and water for 15 hours, of 103. As will be seen, soaking seems to be the only means of improving the germination of mangel seed, and it has very little influence.

FLAX.

Project No. 88.—For three years, an acre of flax has been grown for fibre and the straw sent to Ottawa where it is examined and worked to see if the district is suitable for this crop. The average yield of straw has been 3,737 pounds per acre.

FERTILIZERS.

Work on four projects was completed in 1918.

Comparative Value of Different Forms of Nitrogen.

Project No. 31.—The object of the experiment was to compare nitrate of soda with sulphate of ammonia as a source of nitrogen, when the elements phosphorus and potassium are in sufficient quantity. A three-year rotation of potatoes, oats and clover was followed. The result was that if 100 is taken as the crop obtained from sulphate of ammonia, then the crops obtained with the use of nitrate of soda would be represented by 136 for potatoes, 101 for oats, whilst the quantity of clover hay was practically equal in both cases.

Comparative Value of Different Forms of Phosphorus.

Project No. 32.—The object of the experiment was to compare superphosphate, basic slag and bone meal as sources of phosphorus, when the elements nitrogen and potassium are in sufficient quantity. A three-year rotation of potatoes, oats and clover was followed. The result was that if 100 is taken as the crop obtained from superphosphate, then the crops obtained with the use of basic slag and with the use of bone meal would be respectively represented by 56 and 47 for potatoes, 100 and 113 for oats, 110 and 115 for clover hay.

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Value of Ground Seaweed as a Fertilizer.

Project No. 33.—The object of the experiment was to find out the value of ground seaweed as a fertilizer, especially as a source of potassium. A three year rotation of potatoes, oats and clover was followed. An application of 31.5 pounds of phosphorus and 22.5 pounds of nitrogen per acre, or of 31.5 pounds phosphorus and 40 pounds potassium, or of 31.5 pounds phosphorus, 22.5 nitrogen and 40 pounds potassium all gave much better crops than an application of 1,500 pounds ground seaweed. As a source of potassium, if 100 is taken as the crop obtained by 1,500 pounds of ground seaweed, then the crops obtained with the use of 100 pounds of muriate of potash would be represented by 128 for potatoes, by 90 for oats, and by 124 for clover hay.

Comparative Value of Burned Lime and Ground Limestone.

Project No. 28.—The object of the experiment was to compare the value of burned lime with that of ground limestone on a clayey loam of better than average fertility. The rotation followed was oats, clover and timothy. The result was that if 100 is taken as the crop obtained with the use of ground limestone, then the crops obtained with the use of burned lime would be represented by 102 for oats, 113 for oat straw, 106 for clover hay, 116 for timothy hay, about the same quantities of oxide of calcium being applied in both cases. When fifteen tons of manure was added to both, and if 100 is taken as the crop obtained with the use of ground limestone, then the crops obtained with the use of burned lime would be represented by 120 for oats, 91 for oat straw, 107 for clover hay, and 95 for timothy hay.

HORTICULTURE.

The investigations in this division relate to fruits, ornamental plants, and vegetables.

FRUITS.

Work with fruits consists in the testing of varieties, the selection of good strains, and cultural experiments.

Variety Tests.

There are now on test the following number of varieties: apples, 148; cherries, 16; pears, 4; plums, 37; black currants, 14; red currants, 11; white currants, 3; gooseberries, 11; raspberries, 10; strawberries, 26; grapes, 29, or a total of 309.

Apples.

Project No. 87.—Of the 148 varieties of apples on test, none has been planted before 1911, but the ones which seem the best adapted to this part of Quebec are Yellow Transparent, Lowland Raspberry, Red Astrachan for summer; Duchess, Montreal Peach for autumn; Wealthy, Milwaukee, Wolf River, Fameuse, McIntosh Red, McMahon White for winter. Rupert for Summer, Petrel for autumn, Walton for winter are three splendid ones introduced by the Central Experimental Farm, Ottawa, but not yet for sale by nurserymen.

Cherries.

Project No. 86.—None of the sweet cherries is hardy enough for central Quebec. Of the sixteen varieties tested, the ones which seem to be best adapted here are Early Richmond, Montmorency Large, Orel No. 25, Griotte Morello, Vladimir.

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Pears.

Project No. 93.—It is probable that no variety of pears will be a success so far north, and only one fruit was produced here, though some of the trees have been planted since 1913. Clapp Favorite and Flemish Beauty are the two most promising.

Plums.

Project No. 76.—Contrary to expectations, a larger percentage of the European varieties have lived at Cap Rouge than of the American varieties, whose wood breaks very easily. Of the first kind, the best seem to be Bonne Sainte Anne, Shipper Pride, Quackenboss, Montmorency, Raynes, whilst Bixby, Mankato and Cheney are the leaders amongst the latter.

Black Currants.

Project No. 68.—Of the fourteen varieties of black currants on test for seven years, Climax leads with an average yield of 8,362 pounds per acre, followed by Saunders with 6,556 pounds. Both these varieties were originated at the Central Experimental Farm, Ottawa. Of the ones in the trade, Boskoop Giant showed up well, with 5,261 pounds per acre.

Red Currants.

Project No. 69.—Eleven varieties of red currants have been on test since 1912. The two highest yielders are Fay Prolific with an average production of 8,470 pounds per acre, and Perfection with 7,287 pounds.

White Currants.

Project No. 70.—White currants have given much smaller crops than either the blacks or the reds, at Cap Rouge, though planted alongside of the others at the same time. White Grape is the best of the three varieties tried here for seven years and has averaged 4,085 pounds per acre.

Gooseberries.

Project No. 71.—Eleven varieties of gooseberries have been tested since 1912 and the highest yielder is Houghton, with an average production of 17,065 pounds per acre, but the fruit is too small. The one which is the most promising is Silvia, originated at the Central Experimental Farm, Ottawa, which yielded at an average rate of 13,103 pounds per acre.

Raspberries.

Project No. 72.—Out of ten varieties tested, Herbert is the highest yielder, with an average production per acre, during seven years, of 2,113 pounds. King was the earliest, but gave only 1,971 pounds per acre.

Strawberries.

Project No. 73.—Though a plantation was started in 1911, the variety tests were in uniform shape only in 1915, so that results have been tabulated for four years. The heaviest yielder is a seedling from the Central Experimental Farm, Ottawa, called Cassandra, which averaged 9,333 pounds per acre. The variety in the trade that, at present, seems the most worthy is Dunlap, which produced at the rate of 7,530 pounds per acre, whilst Excelsior was the earliest, and gave 5,646 pounds per acre.

Grapes.

Project No. 122.—Twenty-nine varieties of grapes are on test, but very few of them will be early enough for central Quebec. The ones which are the most promising are: Blacks, Champion, Early Daisy; reds, Wyoming, Delaware; whites, Green Mountain.

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SELECTION OF GOOD STRAINS.

Besides many seedlings of apples, plums, black, red, white currants, gooseberries, raspberries, strawberries, there are a great number of grafted stock from scions of apple trees known as early or heavy bearers, also bushes, canes, plants, and vines from individual currants, gooseberries, raspberries, strawberries and grapes which have shown superiority in some way or other. No strain is selected except from a variety which stands well at the top of its class in the trial plots, in regards to certain characters such as yield, hardiness, earliness, or quality.

CULTURAL EXPERIMENTS.

There are two projects: The comparison of different cover crops for an apple orchard and the comparison of different methods of planting strawberries, but they have not been under way long enough to warrant publishing results. In the first one are compared red clover, vetches, rape, each of them sown every year, rape followed by clover in a two-year rotation, permanent sod with hay cut and placed around the trees as a mulch, also permanent sod, with hay taken away. In the second, the matted row is compared with plants set every foot in the row.

ORNAMENTAL PLANTS.

A total of 665 varieties of ornamental plants, including 292 annuals, 190 perennials, 183 shrubs and trees were on test during 1918. Besides beautifying the grounds of the Station, these are used to find the ones which are best suited to the conditions of Central Quebec, and some of them to produce seeds and plants for distribution. Work has been started, on a small scale, to try and produce special strains of the flowering plants which are well known to farmers, and a seedling geranium is now propagated which is certainly much above the average.

VEGETABLES.

The main lines of work with vegetables relate to the testing of varieties, the isolation of valuable strains, cultural experiments, and seed growing.

Variety Tests.

Though variety tests were somewhat cut down in 1918, still there were ninety different kinds of beans, beet, cabbage, carrots, corn, onions, peas, potatoes and tomatoes in the trial plots. Generally, a variety is tried at least five years before being discarded, unless it is plain that it will not be adapted to the district.

Isolation of Valuable Strains.

Work was continued during 1918 in isolating good strains of some of the varieties of vegetables which have shown, by their earliness, yield or quality, that they are profitable to grow in this district. An important point which must not be overlooked is resistance to disease, and, unfortunately, this does not always go with the above-mentioned qualifications. Within a couple of years some of these strains, which have been selected from four to eight seasons, will be named and possibly offered to the trade.

Cultural Experiments.

There are twenty-one different cultural experiments with vegetables. They relate to thinning distances for beets, carrots, parsnips, turnips; protection against maggots for cabbage and cauliflower; methods of blanching for celery, of forcing for rhubarb.

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of training, staking and artificially ripening for tomatoes; comparing sets with plants and open ground seeding for onions; number of eyes, also plastering, for potatoes; comparing varieties of different precocity with one sown at different times for beans and peas. As soon as there are results of five years' experimenting they will be published.

Seed growing.

Seed has been grown at Cap Rouge of practically all kinds of vegetables raised in central Quebec, with the exception of cauliflower. In 1918, there were larger quantities than usual of cabbage, lettuce, radish, peas, salsify, sweet corn, and preparations were made for growing seed of beets, carrots, parsnips, celery, onions in 1919.

EXTENSION AND PUBLICITY.

The work for this division consists in having exhibits at fairs and in distributing literature.

Exhibitions.

Exhibits were made at Three Rivers, Quebec, Lotbinière, and at the Provincial Seed Fair. Over 15,000 persons saw the Cap Rouge products and three diplomas were awarded. It was noted that the greatest number of inquiries were about horticulture, poultry, cereals, dairying and bees, in the order named.

Publicity.

At the above fairs, a large number of circulars were distributed to interested parties, no attempt being made to force publications on people who would probably throw them away as soon as out of sight of the attendants. Quite a number of bulletins were sent out to farmers who wrote inquiring about certain matters and also to each person to whom a free distribution of seeds, plants or trees was made.

DISTRIBUTIONS.

Seventy packets of tomato seed, 26 of cabbage, 7 of swede, 36 of flower, 124 samples of potatoes, 47 of field beans, 5 of garden beans, 2 of field corn, 10 of sweet corn, 9 of garden peas, besides 3,200 strawberry plants, 744 raspberry canes, 141 black currant, 48 red currant, 135 white currant, 117 gooseberry bushes, 834 apple trees, and 216 perennial plants, all grown at Cap Rouge, were distributed during the fiscal year 1918-19.

VISITORS.

Besides a great number who come on Sundays and holidays, in summer, there were 4,030 visitors at the Station during 1918. It is probable that not one per cent can say that all the attention possible has not been given to them, even to spending hours with a single man to give him information on one subject.

CORRESPONDENCE.

During the twelve months, 4,488 letters were received and 5,023 were sent, besides a large number of circulars concerning the free distribution.

BUILDINGS.

The calf barn was completed. With the open shed adjoining it, for yearlings, also the feed room, and the root cellar, it is one of the most up-to-date buildings of its kind in the province of Quebec to-day.

EXPERIMENTAL STATION. LENNOXVILLE. QUE.

REPORT OF THE SUPERINTENDENT, J. A. McCLARY.

THE SEASON.

The ice cleared out of the St. Francis river on April 2, 1918, overflowing the public road and blocking traffic for two days.

The weather throughout the month of April was fair and cool with very little precipitation. The first ploughing was done on the 15th and the first seeding on the 30th.

The month of May was fine and warm, which enabled the farmers to get their crops in early and in good condition, and practically all crops were sown in that month, with the exception of swedes and beans. We were very unfortunate in having frost on the 19th, 20th and 21st of June, which did considerable damage to corn, potatoes, vegetables and beans.

The weather the first half of July was very dull and wet, rain falling on ten out of fifteen days. This excessive amount of rain did much damage to the corn crop by holding up cultivation and retarding growth, also preventing farmers from doing anything at their hay harvest up to the time when the weather cleared and gave them an opportunity to save their hay crop in the best of condition.

The weather during the month of August was very favourable for the ripening and harvesting of the early-sown grains which gave a good yield, but the frost we had in this district on the 18th and 19th, did much damage to the corn and other crops.

There was an excessive amount of rain in the month of September amounting to the 4th of September was practically a loss. On the 11th we experienced 9 degrees of 8.55 inches, which fell on 21 days. Much of the grain that was not harvested before frost which practically ruined the corn which was not harvested.

The month of October was also very wet with 6.19 inches of rainfall. The wet weather did much in holding back fall ploughing and other work that should have been done this month. The first snow fell on November 14 and ploughing had to be discontinued on the 27th on account of frosts.

December was much milder than usual, the first sleighs being used in this district on the 4th. The St. Francis river, which runs through the farm, was not frozen over at the end of this month, where in 1917 it was frozen on the 26th of November.

January was very mild and fine with very little snow. The month of February was also very mild. There was not the usual amount of snow during the winter, although sufficient for farmers to get their team work well along.

The weather throughout the month of March was very mild with practically all snow gone by the 15th.

The sugar makers in this district tapped their maple trees around the 15th with a very good yield for the month.

The ice cleared out of the St. Francis river, without any damage being caused, on March 28, 1919, five days earlier than in 1918.

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METEOROLOGICAL RECORDS, 1918-19.

Month.	Temperatures.					Precipitation.			Total Sunshine.
	Maximum.		Minimum.		Mean.	Rainfall.	Snowfall.	Total.	
	Date.	°	Date.			Inches.	Inches.	Inches.	Hours.
1918.									
April.....	28	74	20	15	59.93	1.21		1.21	195.5
May.....	18	87	10	27	55.87	2.32		2.32	200.5
June.....	1	83	19	31	55.63	4.41		4.41	193.3
July.....	22	90	3	38	65.85	2.62		2.62	208.5
August.....	23	88	18	30	62.27	2.39		2.39	230.5
September.....	22	59	11	23	51.85	8.55		8.55	103.2
October.....	28	71	8	21	45.54	6.19		6.19	107.4
November.....	19	48	28	9	32.46	3.0	3.50	3.65	58.9
December.....	23	48	31	-18	20.75	0.94	19.50	2.89	34.6
1919.									
January.....	2	43	12	-27	16.45	0.10	18.00	1.90	38.5
February.....	22	44	11	-20	15.66		12.30	1.23	101.7
March.....	26	60	13	1	27.56	0.77	14.50	2.22	122.6
Total.....						32.80	67.80	39.58	1,595.2

LIVE STOCK.

Horses.—There are at present at this Station, nineteen horses, consisting of four registered Clydesdale mares, one young Clydesdale stallion born July 21, 1917, which weighed on April 1st, 1,255 pounds, one registered Clydesdale filly foal, born August 3rd, 1918, one carriage horse and twelve grade Clydesdale work horses. The mares at this Station are bred to foal in the month of August, if possible, so as to have the use of them in spring when horse labour is so important on the farms. The foals are run with their dams until March 1st, when they are weaned and the mares got into condition for seeding. Outside of our brood mares, we winter all horses that are not needed for work in the winter months, by running them in a yard with shelter at night, and feed a ration consisting of 20 pounds hay, 28 pounds ensilage and 2 pounds bran per day.

Cattle.—The Ayrshire herd at this Station at the end of March comprises forty head, as follows: 16 cows, 6 two-year-old heifers, 3 yearling heifers, 7 six-month-old calves, 7 young calves and one stock bull.

The calves from Gardrum Bold Boy-47138 look very promising and we see no reason why heifers, from this excellently bred stock bull, from high milk-producing dams, should not make good later on. We have already passed five Ayrshire cows of this herd in the Record of Performance test with others finishing soon with a good margin to their credit. These cows are being bred to freshen, where possible, within 365 days, wishing to increase our females as fast as possible in order to get the number required for our herd. The bulls from this herd are sold to farmers in the district at a nominal price and with good care and attention should make excellent herd headers for the Ayrshire herds in this section.

Shorthorns.—There were purchased for this Station in the month of January, as a nucleus of a dual purpose Shorthorn herd, five females and one young bull, as there seems to be a strong feeling among breeders of the Eastern Townships, (which is noted above all other districts of the province as a beef district) to have a cow that will produce a calf that, when grown, will produce the best and most economical beef, and at the same time give a good fair revenue from her milk. We feel that with proper selection and attention much can be accomplished along this line of work with the Shorthorn breed of cattle.

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Beef Steers.—There are at this Station at present seventy-nine beef steers that were purchased in the month of November in order to consume the hay and silage grown at this Station. These steers will be marketed the last of April. Twenty-five of these are three-year-olds and the balance two-year-olds. The figures of the cost of grain per pound of the different ages will be given when marketed.

Sheep.—The sheep at this Station comprise sixty-three head, viz., eleven registered Oxford ewes, five registered Oxford shearlings, two registered Oxford rams, thirty-four grade Oxford ewes, ten grade Oxford shearlings and one registered Shropshire ram. A grading experiment is being carried on at present with ten grade Oxford ewes crossing with a Shropshire ram, to ascertain the results of the wool clip and weight of marketable lambs from this cross compared with Oxfords.

The wool from this flock was graded and sold through the Sherbrooke County Wool Growers' and Sheep Breeders' Association in the month of June, grading as follows:—

220	pounds	fine combing at 79 cents..	..	..	..	..	..	..	..	\$180	91
14	"	fine medium combing at 75 cents..	..	..	..	..	..	..	..	10	50
26	"	fine medium clothing at 70 cents..	..	..	..	..	..	..	..	18	20
145	"	medium combing at 73½ cents..	..	..	..	..	..	..	..	106	57
27	"	rejects at 45 cents..	..	..	..	..	..	..	..	12	15
										\$328	33
Less commission..										4	20
										\$324	13

There were also sold through this same organization thirty-four mutton lambs and fifteen mutton ewes. This local organization and other such organizations in different districts have done much in the Eastern Townships to help and encourage the farmers in raising more sheep by giving them the best opportunity possible to dispose of their wool and mutton at the highest prices available.

Swine.—There were furnished this Station from the Central Experimental Farm, Ottawa, in the month of June, six young registered Yorkshire sows and one boar as a starter in this important line of animal husbandry work, in order to have some stock for the new piggery, which was built in the months of November and December of this fiscal year.

POULTRY.

There is not much yet to report on poultry as there has been work done only this past year on the erection of a poultry administration building 22 by 26 feet, with concrete basement for incubator and egg rooms, the upper story to be used as office and living quarters of man in charge, also a feed room. There have also been built a permanent poultry house 16 by 30 feet, two colony houses and yards erected. There is installed in the incubator room, one Mammoth incubator with a capacity of 200 dozen eggs. This work is starting on the first of April with an experienced man in charge, who will rear as many chicks as possible this coming season and select from them the foundation stock for this work which is to be carried on here.

The breed that will be used for the work at this Station will be Barred Plymouth Rocks. These will be trap nested and records kept of each individual with the object of improving the laying qualities of this popular breed in this district.

It is expected to do some poultry survey work in this district amongst the farmers and poultry raisers.

An addition to the plant will be made during the following summer.

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BEES.

There was a small start made in bees in the month of May with two colonies furnished this Station from the Experimental Farm at Ste. Anne de la Pocatière. These increased through the season so that there were five colonies put into winter quarters in the fall.

FIELD HUSBANDRY.

Rotations.—The rotation followed at this Station is the general four years' rotation consisting of hoed crops the first year such as roots, potatoes and corn. For roots, the land is ploughed after the hay is taken off. then summer fallowed and ploughed the following spring. For corn, the manure is spread on sod in winter, ploughed under in spring and disced until a good seed bed is made and then corn planted. Second year, sown to wheat, oats or barley, and seeded at the rate of 10 pounds clover, 2 pounds alfalfa and 10 pounds timothy per acre; third year, hay. There will be practically no timothy showing the first year. The first cut of clover is saved for hay and harvested the latter part of June. The second crop is used for seed, or if the season is not favourable for seed production, it is cut and put into the silo where it makes the most palatable and nutritious feed that we have for our live stock. All stock relish and thrive well upon it and the dairy cow will produce the maximum amount of milk with silage made from good clover in conjunction with other necessary feeds. Fourth year, clover and timothy hay.

Crop Yields.—The crop of hay harvested the past season was of the very best quality, having excellent weather to harvest same. The crop at this Station comprised 275 tons.

The cereals consisted of 75 acres of oats which yielded 48 bushels per acre, 22 acres of a mixture consisting of 4 parts oats, 2 parts two-rowed barley, 1 part wheat. The yield from this mixture was 45 bushels per acre of excellent heavy grain which makes the best of feed for live stock when ground, 3 acres of Red Fife wheat, yielding 20 bushels per acre, making a total of 100 acres in grain.

There were 30 acres planted to Indian corn for silage purposes. With frosts the middle of June and also on the 18th and 19th of August, this crop was practically a failure, having a very light yield and some of it being so badly frozen that it was not of any use.

Three acres were planted to potatoes of different varieties in order to procure seed for distribution in the twenty-four counties in the southeastern part of Quebec, which this farm is supposed to serve. The yield was 250 bushels per acre.

One acre of beans was planted which were a total failure on account of early frosts on the nights of the 18th and 19th of August.

FORAGE CROPS.

Roots.—Six varieties of swedes were tested, Good Luck giving the highest yield of 16 tons 1,802 pounds per acre, with the Invicta Bronze Top the lowest with 15 tons 1,188 pounds. The fall turnip giving the highest yield was the Golden White Globe, 15 tons 1,556 pounds.

Three varieties of mangels were tested, the Mammoth Yellow Intermediate giving the highest yield of 16 tons 626 pounds per acre and the Prize Mammoth Long Red the lowest with 11 tons 84 pounds.

Four varieties of sugar beets were under test, the Improved Valmorin A yielding 10 tons 1,910 pounds, with the Klein Wanzleben the lowest with 10 tons 255 pounds.

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Three varieties of carrots were under test, the Improved Short White giving the highest yield of 10 tons 90 pounds, and the Danish Champion 6 tons 1,068 pounds.

Ten varieties of silage corn were planted, but no results were obtained on account of the frosts which ruined the same on the 18th and 19th of August.

HORTICULTURE.

During the season just past, extreme conditions were recorded which have hardly been known in former years to the settlers of this district, and which have to a very great degree acted as what may be termed a real test winter for the fit varieties, or such as in future years may prove of value for the district. This applies to fruit trees, cane and bush fruits, flowering shrubs and perennial flowers.

The very low temperatures recorded during the course of the winter of 1917-18 certainly were very hard on all varieties. The long cold spell which lasted from the time winter set in, early in November, until the spring opened, was without a thaw. It was noticed that many of the old, well-established trees had been severely damaged, not to mention the severe injury that had been done to the younger trees.

Throughout the summer conditions continued very backward and cold; frosts occurred the middle of June, with a very cool spell in July, followed by quite a severe frost about the middle of August, which did severe damage to all the tender crops. The weather was quite warm for a period lasting to the 10th of September, when a very severe frost cut off all crops entirely.

ORCHARDS.

Cultural Apple Orchard.

The amount of damage done to the orchard was not actually ascertained until well on into the season, because of the character of the injuries sustained by the trees. About 30 per cent of the 869 trees were damaged, of which 27 per cent will have to be replaced. In fact, it should be noted that many of the trees that survived are affected with black heart, which may result in considerable loss later on.

The varieties which suffered the most are as follows: Blue Permain, Bethel, Milwaukee; Fameuse, and McIntosh. But it should not be inferred that these are the only varieties that suffered, as there was damage done to considerable extent in the case of the other sorts.

Replacing of the severely damaged trees was carried as far as was possible, from the small stock of trees carried in the nursery.

All the regular routine work in connection with the care of the orchard was attended to.

Variety Apple Orchard.

The amount of complete killing in this orchard was comparatively small, and it may be said that the majority of the new varieties from Ottawa have wintered in medium condition, generally speaking.

The following is a list of the varieties which were added to the orchard, in order, as standard and filler trees:—

8 Elmer, 0-2632; 8 Forerunner, 0-2649; 8 Honora, 0-3047; 8 Rupert, 0-3051; 2 Ambo, 0-2608; 2 Craignaivie, 0-3007; 2 Dodd, 0-2562; 2 Drumbo, 0-2601; 2 Emelia, 0-2626; 2 Fameuse Red, 0-2613; 2 Lipton, 0-2634; 2 McCarthy, 0-2553; 2 McKinnon, 0-2543; 2 Okabena, 0-2985; 2 Thompson's 35, 0-2109; 2 Antonovka (Augustin), 0-2987; 2 Golden White, 0-2004.

Cherries and Pears.

These two classes of fruit trees have not stood the severe winters of the past three years, and as a consequence there is nothing but negative results to report. The

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cherries have kept killing out, leaving only a few trees that are in very poor condition; while in the case of the pear trees there is nothing of the original trunks left, except the stump at the ground from which new growth is formed each season, only to be killed back the following winter.

Plum Orchard.

In the plum orchard the trees wintered very well and made very satisfactory growth. The standard varieties did not show quite as much vigour as the seedling varieties, but, on the whole, all can be considered very satisfactory.

There was no bloom on any of the trees, which was due to the severity of the winter.

Grapes.

Out of the fifteen varieties planted in the spring of 1915, there are three which have indicated, so far, that there is a possibility of securing fruit, if an average year with favourable growing season is recorded. During the past two years Moore's Early, Wilkins, 0-261, and Herbert, have produced a few bunches of fruit which began to colour before the frost came.

Raspberries.

The raspberry crop was considerably smaller than the previous year. In fact some of the varieties yielded practically nothing.

Herbert died out almost completely, and some damage was noticed on the canes of the other varieties.

In order, the varieties are given as to merit:

King, Brighton, Count, and Sarah.

Currants.

Black.—The following varieties are considered to be of superior quality, from their performance at this Station:—Saunders, Climax, Buddenberg and Victoria.

Red.—As follows: Red Grape, Lees Prolific and Victoria.

White.—There are only three varieties of these, they are given in order of merit:—Cherry, Grape, Large White.

Gooseberries.

The returns from this class of fruit were very small, but the bushes are making very good growth.

Propagation.—Quite a large quantity of cuttings of all the varieties of bush fruits was made, and set out for distribution work. These have developed into very nice plants and will be available for distribution this spring.

An attempt was made to start some grape vines from cuttings, but the success of the venture was not by any means very satisfactory, which was due to the ground not having been well enough drained where the cuttings were stored over winter.

Strawberries.

In the thirty varieties of strawberries which have been under test, there was very great interest taken. This is due to the fact that the prices of this particular fruit have been unusually high during the past few years, with a very scant supply of locally-grown fruit.

The following varieties have been giving good returns during the past three years at this station:—

Senator Dunlap, Buster, Glen Mary, Howards No. 41, Portia (sdlg.), Valeria (sdlg.)

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VEGETABLES.

The work in the vegetable garden is divided into variety and cultural tests.

During the past season almost all the work has been in connection with variety tests, this being done to allow more time to be devoted to seed production. However, some of the cultural tests were continued and brought out some very useful information.

The following vegetables were used in connection with the work: Cabbage, cauliflower, turnip, onion, leek, salsify, egg plant, pepper, radish, lettuce, spinach, beet, carrot, parsnip, beans, peas, corn, tomato, potato, cucumber, squash, pumpkin, citron, melon (musk and water), and ground cherry.

Considerable seed of the following vegetables: Cabbage, beet, parsnip, onion, spinach, Malcolm corn and Gradus peas was grown, some of which was used for seed distribution.

ORNAMENTALS.

In connection with the ornamental grounds, there was considerable replacing of shrubs necessary as a result of the severity of the winter, and also quite a number of the perennial flowers had to be replaced.

Parts of the borders were of such heavy land that it was found necessary to apply a liberal dressing of good, coarse river sand, to remedy the texture of the soil. The effect of this was very soon noticeable, and where formerly there was a very poor stand of plants, all varieties were thriving very well.

Bulbs.—There was a very fine showing in the early part of the season, while the tulips were in bloom.

Annual flowers.—A very satisfactory flower garden was the result of much difficult and up hill work. Nearly all the varieties came along satisfactorily, supplying a great profusion of bloom from early in July until September 10, when all the flowers were frozen.

Perennials.—The perennials were in bloom from early in the month of May until the hard frost came in September. The range of varieties which are kept in nurseries, in addition to those in the borders, and beds, were a great attraction for visitors.

Flower seeds.—To meet the call for flower seeds, quite a large quantity of very good seed of fairly high germination was saved from the plants in the nurseries, without any great effort, as all varieties of perennials ripen their seed very well. This seed is available for distribution.

SEED DISTRIBUTION.

This year there was no general distribution of garden, vegetable and flower seed, as in other years. It was thought inadvisable to continue this branch of work, since the main idea of creating interest in the value of home grown seed had been brought to the attention of the people very well during the past three years. However, quite a few applications were received, which were filed, and later on seeds sent out.

Potatoes.—The distribution of samples of potatoes was conducted again this year. Five hundred and fifty three-pound packages were sent out.

The varieties used were: Green Mountain, Irish Cobbler, Rose of the North and Early Ohio.

FARM IMPROVEMENTS.

The artesian well that was sunk 385 feet in the summer of 1917 has been connected with the deep well pump, which pumps the water from this well into two large pneumatic

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tanks, thus furnishing an excellent water supply to all the different buildings connected with this Station. This pump is operated by a 5 h.-p. electric motor with automatic pressure regulator. There was also laid this season 3,000 feet of water mains connecting up this system with all the different buildings.

ROAD WORK.

Considerable work was done on the new farm road running from the Ascot Consolidated School on the northeast corner of this property to the southeast corner. This road has been used by pupils attending this school from the south part of the district.

There were also drawn 520 loads of gravel which was used for surfacing the public roads running through the Farm. This little surfacing of gravel makes it possible to keep our roads in the very best of condition for the heavy amount of traffic that passes over them.

BUILDINGS.

The dairy building that was started in 1917 has been completed and is now ready to have the equipment installed for the farm dairy.

There was built in the months of November and December a new piggery 24 x 60 feet with feed room 16 x 16 feet.

The poultry administration building, which was started in 1917, has also been completed and made ready for work being started the first of April, 1919. There have also been built two colony houses.

The house for the assistant to the Superintendent has been remodelled.

An old house that was located on the Farm near the dairy barn has been remodelled and makes a very useful house for the herdsman.

MEETINGS.

On the 15th of August there was held the fourth annual summer Farmers' Day at the Lennoxville Station, which was attended by over 3,000 people, all showing much interest in the work under way at this Station. Addresses were given at this meeting by the Acting Deputy Minister of the Federal Department of Agriculture, Director, Experimental Farm System; Hon. Senator Foster, Montreal; Mr. Joseph Bégin, Superintendent Experimental Farm, Ste. Anne de la Pocatière; Mr. A. L. Paterson, Mr. T. F. Ritchie and others.

One interesting feature at this gathering was the presenting of medals to the Soldiers of the Soil, who were school boys under the age of eighteen, who devoted their time through the summer months to helping out at agricultural work.

There was also a canning demonstration carried on by the Domestic Science Branch of Macdonald College, under the supervision of Mrs. MacFarlane.

Other meetings were held throughout the winter months with lantern-slide views given principally by the assistant to the Superintendent.

EXHIBITIONS.

This Station's exhibit at the Great Eastern Exhibition at Sherbrooke covered a space 12 by 50 feet, which was very artistically arranged with models of buildings, exhibits of cereals, roots, seeds, sheafs of grain and grasses, vegetables and flowers, and displays of bee and poultry products.

The farm exhibit was also shown at Richmond and the Ste. Scholastique Fair in the county of Two Mountains. The interest manifested in these exhibits was very keen and much literature was distributed and mailing cards secured.

VISITORS.

A very large number of people visited the Farm this past year, much in excess of former years. Much interest seems to be taken in the animal husbandry work that is

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being carried on, especially with the dairy and beef herds as well as sheep, swine and horses. There was a large attendance in the garden and grounds throughout the summer months. We are looking forward to much interest being taken in the poultry work which is just being got under way, considering the large number of inquiries we are having in this important branch.

EXPERIMENTAL STATION, SPIRIT LAKE, QUE.

REPORT OF THE FOREMAN-MANAGER, PASCAL FORTIER, B.S.A.

THE SEASON.

As early as the first few days of April the snow had all cleared off and the weather, although cold, was bright throughout the month. May, however, was rainy and cold, rain falling on 14 days and snow on 6 days. June was also rainy and cool, having 14 days of rain, 5 of snow, and frost on 6 occasions. Not only the grains sown at the end of May and during the month did not germinate, or were retarded in growth, but many of the garden vegetables which had been sown or transplanted, died, and, in each case, it was necessary to recommence. July was the best growing month, the only one during which there was no frost. 3.15 inches of rain fell in August, it froze on the 3rd, 16th, 17th, and very hard on the 18th. Beans, cucumbers, melons, citrons, pumpkins, tomatoes and a few potatoes were practically destroyed. Only cabbage, carrots, celery and the roots remained and these gave poor yields, not having done well during the summer. With September, the rainy season commenced and continued, with little interruption, until January 1. Hay was a fair crop, but the cereals, not having matured, made poor forage. It is to be noted that, in this season, only five consecutive weeks were without frost and only two months without snow. The winter, however, from January 1 to April 1, was comparatively mild for this region.

LIVE STOCK.

Horses.—Seven horses were sent to the Experimental Station at Kapuskasing in August, 1918, leaving only 13, of which 10 are heavy draught and three carriage horses. Of the 10 draught horses, 3 are Clyde mares, one Percheron, and 6 other Clydes. The cost of feed amounted to 44 cents per day per horse owing to the fact that nearly all the oats had to be bought, as well as a quantity of hay, most of which had to be purchased elsewhere than in this district, thus greatly increasing the cost of keep.

Cattle.—The herd comprises seven milch cows, of which 3 are Ayrshire and 4 Holstein, one Ayrshire bull, 2 steers, twin Ayrshire heifers and one Holstein heifer calf. The average cost of feed per milch cow per day was 35 cents.

Swine.—At present this Station has 22 hogs, consisting of 4 sows, 1 boar, 16 young pigs and 1 boar to fatten, all Yorkshires. During the year 5 young pigs at four weeks old, having cost about \$1 each, were sold for \$12 each.

Sheep.—There are now 23 ewes and 2 Cheviot rams, the latter coming from the MacDonald College, Ste. Anne de Bellevue.

Poultry.—All the old birds of the flock were disposed of and 25 Plymouth Rock pullets purchased.

CEREAL CROPS.

Forty-three acres were sown in the spring of 1918, consisting of 30 acres of oats, 5 of wheat, 3 of buckwheat, and 5 of barley. On account of the damp, cool weather, none of the grains reached maturity, so that it is impossible to give the yields. Sixty tons of hay were cut from 50 acres, the average being low, but, in some cases, the yield was 3 tons per acre. Nearly 25 acres were sown to millet, clover and alsike.

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CLEARING.

During the year about 30 acres were burned over and 21 acres put under cultivation. In the winter 3 acres were cleared, using different methods with each acre, with a view to find out the cheapest and best way of clearing land.

HORTICULTURE.

Vegetables.—This season produced meagre results owing to the late cold spring retarding planting until the last of May or the first of June. If it is taken into account, however, that there was frost every month except July, the results of the peas, celery, cabbage, carrots, and lettuce were excellent. The more tender plants, as tomatoes, beans, cucumbers, melons, pumpkins and citrons were completely destroyed. Of the four acres of Green Mountain potatoes, those along Spirit Lake were excellent until the frost came, but, when harvested, the remainder, although numerous, were small and immature.

Fruits.—The apple trees suffered from the severe winter, especially the plants received in October 1917. Eighty plants sent from Ottawa in the autumn of 1918 were planted in their permanent location. The nine varieties of strawberry plants sent from the Central Farm are doing well. Red currants and raspberries have given good results.

Flowers.—Many of the flowers were killed by the severe season; the annuals however, promise to succeed in spite of the weather. Certain varieties withstood the frost of the 18th of August and of these the seed was saved to be used next year. The dahlia bulbs were completely destroyed by the frost on September 11.

Ornamental Trees.—Of the trees supplied by the Forestry Service of the province of Quebec, consisting of white elm, white plane, sugar maple, red oak and white ash, many were seriously affected by the severe winter. Of the 396 ornamental trees furnished by the Central Farm in the autumn of 1917, at least 10 per cent are dead.

IMPROVEMENTS.

No new buildings were put up during the year and only the most urgent repairs attended to. With some old material, a sheep-fold, large enough to accommodate 25 sheep, was constructed. A new road for a distance of a half-mile from the Farm to the station, intended as a public highway, has been commenced. A culvert now passes under the railway, carrying towards the lake the drainage from the lower part of the farm; drains have been dug for a distance of a half-mile.

VISITORS.

Although there is need of a passable road from the near-by villages leading to the Farm, yet the visitors to the Farm are more numerous each year.

EXPERIMENTAL STATION, KAPUSKASING, ONTARIO.

REPORT OF THE FOREMAN-MANAGER, SMITH BALLANTYNE.

WEATHER CONDITIONS.

Weather conditions during the month of April, 1918, were the finest seen in this section for a number of years, bright sunshine prevailing 202.3 hours. The soil on well drained areas was in better condition for cultivation during the month of April than at any time during the later spring months, as the weather during the month of May could for the most part be classed as winter weather; very little sunshine being recorded which, with cold north winds for the greater part of the month with snow and rain, caused the seeding operations and work of any kind on the land at this Station, to be delayed. The date of first seeding was May 30, but owing to adverse

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weather conditions during the greater part of the following month, seeding was not finished until June 20. The soil at any time during the seeding period was in very poor condition for cultivation. The weather conditions in general during the months of July, August and September, were decidedly unfavourable to crop production, while frost was encountered each month during the season; it cannot be said that great damage resulted, other than damage to potatoes planted on high land which were affected seriously by frost August 3. The months of October and November were not favourable for farm work owing to heavy precipitation which to a great extent retarded our progress in fall ploughing, and general work.

The months of December, January, February and March have been the finest seen in this section during the past fourteen years, the snow fall being very light, with high temperatures prevailing with very little north wind.

METEOROLOGICAL RECORDS.

Year.	Temperature F.			Precipitation.			Total Sunshine.
	Highest.	Lowest.	Mean.	Rain.	Snow.	Total.	
	°	°	°	Inches.	Inches.	Inches.	Hours.
1918.							
April	68	- 7	32.3	0.075		0.075	202.3
May	80	20	41.7	0.791		0.791	148.6
June	72	26	49.8	0.522		0.522	No record- ing cards.
July.....	82	31	57.1	2.883		2.883	151.22
August	77	30	57.2	0.145		0.145	231.05
September.....	73	29	44	2.752		2.752	75.3
October.....	64	20	40.6	1.985		1.985	77.1
November.....	56	- 2	31.3	2.65	4.5	3.1	19.5
December.....	55	-30	10.2	0.9	6.0	1.5	100.9
1919.							
January	33	-33	6.23		5.0	0.5	79.9
February	37	-24	9.53		9.5	0.95	93.5
March.....	59	-33	15.97	0.3	5.0	0.8	171.2
Totals				13.003	30.0	16.003	

LABOUR CONDITIONS.

Owing to the scarcity of civilian farm labour, this Station had during the past season to depend mainly on prisoners of war from the Internment Camp here, which to a great extent relieved the labour situation, yet prison labour, owing to shortness of hours worked, could not be classed as satisfactory for farm work, more especially during the harvest season. Shortly after the signing of the armistice, prison labour was withdrawn, which prevented our carrying out the plans made in connection with land clearing operations during the past winter. However, a marked change is noticed in the labour market within the past two months, civilian labour being much more plentiful; and no difficulty is expected in procuring men for farm work during the coming season.

FIELD CROPS.

About 100 acres were devoted to this branch of work.

Fall Wheat and Rye, 1917-18.—Fall wheat and rye sown August 20 and 30, 1917, made a remarkable growth, and matured, yet it is well to state that this crop was in the soil about one year, the dates of harvesting being August 26, 1918, and September 4, 1918. Rye harvested August 26, gave a yield of 22 bushels per acre, wheat harvested September 4, yielding 30 bushels per acre. Owing to extremely wet weather which prevented this crop being harvested sooner than the dates mentioned, a considerable loss was sustained through shelling.

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Fall Wheat and Rye, 1918-19.—Eleven and one-half acres were sown August 20 and 26, 1918, which had an excellent stand when winter set in, being well protected during the winter.

Spring Wheat.—A plot of three acres was sown in Marquis wheat, also a three acre plot of Red Fife was sown; date of seeding of both varieties being May 30, 1918. While neither variety matured owing to weather conditions and frosts, there was a marked difference between the two varieties, Marquis wheat being at least three weeks earlier than Red Fife.

O. A. C. No. 21 Barley.—Ten acres were devoted to this crop, which grew very tall and rank, but failed to mature fit for seed.

Peas, Oats and Vetch.—Five acres were sown in peas, oats, and vetch. Peas and vetch were a practical failure, except from seed sown on high land which had been heavily manured, where a satisfactory crop was produced, but the results were, without doubt, far from satisfactory. The oats sown attained a fair height but failed to mature.

Banner Oats, and O. A. C. No. 72.—Seventy-one acres were sown in Banner oats, dates of seeding being from June 1 to June 10. The yield from the above was considered very poor. A marked difference was noted between oats seeding on summer-fallowed land and fall-ploughed land; oats sown on summer-fallowed land matured, while oats sown on the same date, on fall-ploughed land, failed to mature.

Two acres were sown in O. A. C. No. 72 oats, on well cultivated soil. Banner oats proved to be far superior both in height and quality, to O. A. C. No. 72 oats.

Forage Crops.—Seventy acres under timothy and clover, both of which gave satisfactory results when harvested, both timothy and clover being of the finest quality, and have proven of good value for feeding purposes. The yield per acre was 1½ to 2 tons.

Silage Corn.—Silage corn was tried at this Station, but without any results, as the corn planted failed to attain any growth.

Results from plot experiments.—Red clover, timothy and alsike sown in ½-acre plots, with nurse crop, without, and in drills, resulted in favour of seed sown in drills, both in quality and quantity.

Forage Plants for Pasture Purposes.—The results from seed sown on a 48-acre tract of stump land during the season of 1917, were most satisfactory, and have provided excellent pasture for stock.

Turnips and Mangels.—Ten acres were planted in turnips, and 2 acres in mangels, on river bottom soil, in a fine location, but the crop was considered a failure, the yield amounting to practically nothing. Both turnip and mangel seed germinated, but no growth resulted, possibly due to excessive precipitation. Results from roots planted at this Station, during the past two seasons, have proven far from satisfactory.

Potatoes.—The potato crop at this Station during the past season must be classed as a poor one, owing to a great extent to heavy precipitation, which flooded river bottom land where the crop was planted; nearly half of the crop was killed by water. The potatoes planted in an area which escaped being flooded produced a fair crop of average quality. This particular area was tile drained, during the past fall, and it is proposed to use it for potatoes, as the soil is well adapted for the growth of these, hence better results are hoped for from this crop during the coming season.

Experiments with Field Grains for Ensilage.—Barley, oats, wheat, peas, and rye, none of which matured fit for threshing, were cut and piled in silo. While this grain was being cut and blown into silo a fine spray of water was kept constantly on ensilage

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as it fell from the blower, which resulted in the ensilage coming out in fine succulent condition, proving to be a very nutritious feed for stock, and will to a great extent be a substitute for corn ensilage.

LIVE STOCK.

Horses.—Sixteen grade horses of draft type are used at this Station, being employed at land clearing and general farm work.

Dairy Cattle.—Fourteen milch cows comprise the dairy herd at the present time, 11 Ayrshires and 3 Holsteins. In addition to these there are 8 yearling Ayrshire heifers, and 8 Ayrshire calves, the latter being the progeny of the registered Ayrshire bull, Spring Bank King, Theodore II, who heads the herd.

Beef Cattle.—Twenty-eight head of western steers fed at this Station, during the winter of 1917-18, were sold May 22, 1918, at 12 cents per pound, live weight. Owing to the high cost of feed and labour, the steers sold at a loss.

Shorthorn Stock.—On November 19, 1918, 20 head of grade Shorthorn heifers were purchased, with a registered Shorthorn bull, from which we hope to build up a fine herd of beef type cattle. One heifer has freshened to date. These were carried through the past winter on clover hay and ensilage, and are in fine condition at the present time.

Hogs.—This department of stock comprises 1 registered Yorkshire boar, and 6 registered Yorkshire sows, which are due to farrow during the months of April and May, 1919.

Sheep.—Twelve registered Shropshire ewes, were received at this Station August 26, 1918, from the Central Experimental Farm, Ottawa. One registered Shropshire ram was purchased October 9, 1918. It is hoped to build from the above a fine flock of registered sheep, yet it remains to be proven that this section of Canada is adapted to sheep raising.

Poultry.—No poultry have been kept at this Station to date, but it is hoped that during the coming season, a start will be made with this branch of the work.

GENERAL IMPROVEMENTS.

Land Clearing.—An area of 100 acres was stumped during the season of 1918, prisoner of war labour, when available, being employed. The cost per acre for stumping this land, leaving the same ready for breaking was \$43.

Horses were used in removing the lighter stumps, the large stumps being removed by machine stump pullers.

In addition to the above, during the winter of 1918-19, an area of 50 acres was slashed, all timber of commercial value being saved; all brush and cull timber being piled ready for burning. The cost per acre for doing this work was \$23.

From this area 400 cords of pulp wood were taken, and 280 logs giving, when sawn, 13,000 feet of lumber, as well as a large amount of fire wood.

Breaking New Land.—Thirteen acres of newly stumped land were broken during the fall of 1918, four horse-teams being used with No. 1 R. R. breaker ploughs. Prison and civilian labour was employed, the cost per acre being \$7.50.

Lumbering Operations.—During the past winter, 3,159 logs were cut on this Station's property, 2,759 of which have been hauled to the sawmill and sawn into lumber, giving 137,752 feet. This lumber has been hauled from the mill to the farm

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and piled in the yard ready for future building purposes. The total cost of this lumber which includes logging, milling, hauling and piling in yard amounts to \$20 per M.

Road building.—One mile of road was graded during the past year, most of which was for the purpose of surface drainage. Owing to the ground being too wet to allow the use of a road grader, the work was done by prisoner of war labour.

Land Drainage.—3,801 feet of tile drain was laid during the past season, in order to have drained several wet areas on the farm. This work was done by day labour.

As the drainage of land at this Station is of vast importance, and having on hand 19,000 feet of tile, it is our intention to have as much as possible of the above laid during the coming season.

Dairy Utensils.—A milking machine of three units was installed during the past season, and is giving good results.

Fencing.—During the past season 430 rods of wire fencing was erected, cedar posts being used, which greatly adds to the appearance of the Station, as well as being a great improvement. In addition to the above, one mile of permanent cedar posts have been erected, with temporary poles nailed on, which affords this Station a protection for stock when on pasture. At a future date wire will be substituted for poles.

Sidewalk.—One half-mile of plank sidewalk was constructed from the railway line to farm buildings, which is a decided improvement.

NEW BUILDINGS.

Herdsmen's Cottage.—This building was constructed during the past season. It is a building of 36 feet by 34 feet with concrete basement, and cottage roof, and is equipped with modern conveniences.

Farm Boarding House.—This building was commenced during the past season, the basement and foundation only being completed, which was due to the scarcity of labour. However, the completion of this building will take place during the coming season.

Silo.—A silo with a capacity of 115 tons, was built and has proven a valuable aid to the supplying of feed for stock.

Temporary Piggery.—This building was constructed during the late fall for the accommodation of hogs, during the past winter. It is proposed to replace it with a permanent building during the coming season.

HORTICULTURE.

This branch of work was much affected both by adverse weather conditions and lack of suitable labour during the early spring when it was most needed. Labour supplied by internment operations for this work was most unsatisfactory.

Ornamental Trees and Shrubs.—The trees and shrubs transplanted May 29 and 30, from the trench where they had been kept during the winter of 1917-18, made a remarkable showing during the past summer, very few being affected by either early or late frosts.

This Station received from the Central Experimental Farm, Ottawa, during the past fall, 443 shrubs, which, owing to the ground being frozen when they arrived, had to be trenched in for the winter months. Native trees were planted on both sides of road leading from the railway line to the farm.

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Small Fruits.—Currants and raspberry bushes gave a fair yield of fruit, and of good quality. Apple and crab apple trees made a good showing, the percentage of loss since the planting of these trees in 1917 being very small.

The following small fruits arrived at this Station last fall too late for planting: 225 strawberry plants, 84 black currants, 90 gooseberries, 42 red currants, 12 white currants, 218 raspberries, 86 apples, and 20 plums. These have been heeled in for the winter, and will be transplanted this spring.

Vegetables.—Many varieties of vegetables were experimented with during the past season. Corn, beets, cucumbers and cabbage were very poor, cut worms giving much trouble to cabbage and beet plants. Summer frosts affected to a great extent the more tender varieties of vegetables.

Different varieties of peas were tested, good results being obtained from all; special mention can be made of the two varieties, Juno (Thorburn), Thomas Laxton (Rennie). Experiments were carried on with beans, carrots, lettuce, onions, parsnips, and radish, which with the exception of beans were a decided success. The beans were stunted by frost during the month of July.

Perennials, Annuals and Seeds.—Many different varieties of flower seeds were planted, a large percentage of which made a remarkable showing. Nine dahlia bulbs received from Charlottetown, P.E.I., were planted in garden plot, all of which bloomed. Considering the conditions under which sweet peas were planted, the result was most satisfactory.

EXHIBITION WORK.

The forman-manager visited the following places in charge of exhibition work: Fort William, Huntsville, Burks Falls, Thessalon, Sault St. Marie.

The exhibits from this Station, consisted of fall wheat and rye, both in sheaf and threshed. The foreman-manager was in charge of exhibition material from the Central Farm, Ottawa, and great interest was taken by the general public who visited the various fairs, as the exhibit was the first shown by the Experimental Farms in districts above mentioned. Much literature was distributed at the various places visited, particular attention being shown by the public toward the models of buildings demonstrated, and the latest methods of cultivation of the soil.

EXPERIMENTAL STATION, MORDEN, MAN.

REPORT OF THE ACTING SUPERINTENDENT, E. M. STRAIGHT, B.S.A.

THE SEASON.

The winter of 1917-18 was most severe—one of the most trying ever experienced in Southern Manitoba. The snow was not deep, but the cold intense, and high winds frequent.

The spring opened early, however, so that the Station was able to report "Snow all gone" by the 20th of March, with temperature 63.5 F. on the 19th of the same month. Some seeding was done on a few farms before the end of March, but unwisely. Temperatures continued high during April for the season, so that seeding could be proceeded with. Gales were almost constant, the sun being obscured with sand and silt for 50 per cent of the time, and the work made most difficult thereby. This cutting sand destroyed thousands of acres of young wheat, and in some instances cut flower plots and vegetables close to the ground. In some sections the top soil all blew off and buried fences in banks of sand. A grateful rain on the 29th of the month was quite general, and improved conditions much.

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The gales continued during May, stronger and more continuous than previous records would indicate for the province. The conditions were aggravated by most rapid change in temperatures and dry weather. On the 5th of May 94 degrees F. were registered, while on the 12th the thermometer dropped to 13.5 above zero. For some weeks following the task for the season appeared hopeless. All vegetation was killed to the ground. Even such hardy plants as rhubarb, cabbage, peas, etc., and the flowering buds of the tree fruits were absolutely ruined. By the end of the month a few showers and calmer conditions had greatly improved matters, and nature was again asserting herself.

June was only moderately warm, and though winds were frequent, yet the damage done by these was mitigated by several showers and one downpour.

As the season advanced the weather continued cold and precipitation much above normal. Growth of all vegetables was remarkable. There was no such thing as holding it in check, so that they went into the frost season on the 9th and 10th of September in rather an unripened condition.

The cereal crops were not affected to the same extent, though the straw was big. The frequent light showers during harvest time made the care of the grain more costly than usual, yet the yield was good and the quality excellent.

The first frost, as previously mentioned, was on the 9th of September, followed by a colder night on the 10th, after which there was much fine weather.

The winter started early and continued late, but exceedingly mild for Manitoba. The lowest temperature recorded was 29 degrees below zero, and that for a very short period. In fact zero readings were rare, but winter lingered until the end of March. Snow for the entire season amounted to a few inches only, and showed little inclination to depart at the close of the fiscal year.

METEOROLOGICAL RECORDS.

Month.	Temperature.		Precipitation.	
	Maximum.	Minimum.	Rainfall.	Snowfall.
1918.				
April...	74.5	6	Inches. 1.67	Inches. 2
May.....	94	13.5	0.63	
June.....	98.5	40	2.30	
July.....	92	41	3.9	
August.....	93	40	2.72	
September.....	82	21	0.7	
October.....	74	18	0.47	2
November.....	57	5	0.83	5
December.....	40	-28		5
1919.				
January.....	39	-28		3
February.....	30.5	-27		5
March.....	39	-20	Snow and rain 1.12	4

LIVE STOCK.

Horses.—Eight horses are kept at the Station farm at present. During the year four mares and three colts were disposed of. Two of these were sold outright, and the others transferred to Indian Head. It was thought advisable to do this in view of the fact of the great shortage of hay throughout the West. A tractor was purchased in the autumn. This tractor will take the place of four horses on the Farm, and will save considerable quantities of feed. The horses kept at present consist of, one four-horse team of heavy work horses, one two-horse team of lighter animals for use in the horticultural department, one driver, and one animal to be used on the one-horse

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cultivator. This arrangement together with the tractor amply takes care of all work on the Farm. All the horses are in excellent condition, and the grades attract attention everywhere.

Cattle.—No cows have been kept at the Station so far, but it is the intention to put in a small herd of dairy animals at no distant date.

Steers.—Thirty steers were purchased in the fall of 1917, and sold at the end of a 151 days' feeding period at some profit. These steers were placed in two pens—fifteen in the barn and fifteen in open front board shed. The average weight of those fed inside was 905 pounds, and those outside 925 pounds. The average gain per steer of those fed inside was 194 pounds, and in the open shed 151 pounds. The profit over feed in the case of the first was \$435.33, and of the second \$366.95.

Other experiments with steers are being conducted at present. Beside the work of inside vs. outside feeding some comparison of breeds is being made together with the effect of an excess feeding of roots, potatoes, etc., in early season.

Sheep.—The grading up work with sheep continues to be of interest and to attract attention. The grade ewes with which the Station started, were probably as poor a flock as could be found anywhere on the range. The influence of the Hampshire males has been marked. Not only do the lambs show the black face, but the character of the wool is much improved. Taking the entire flock last year, the average clip was a little better than ten pounds per animal, and sold at a considerable advance over the market price. The poorest of the sheep were disposed of in the autumn, and the best of the lambs were used to replace them. The flock consists of eighty breeding ewes and two males. Some work is being done with early lambs. These will be offered for sale at Easter. These lambs at Easter will average over sixty pounds in weight, and show conclusively that winter lambs are possible even on the prairie.

Poultry.—No poultry has been kept at the Station, but we hope to make the poultry industry one of the leading lines on the Farm. There is no lesson which needs to be taught more in this western country than how to get eggs in winter.

Bees.—A start has been made with bees, not so much because of the honey produced as the necessity of bees in the work of pollinating in the orchard and garden. Many gardens throughout the province were more or less failures because of the lack of bees. This was especially true during the past season. Practically none of the vine crops set fruit in the Morden section, but at the Station the showing was excellent. We attribute this largely to the work of the bees. The one colony showed lack of vigour in the spring and continued somewhat weak when it went into winter quarters. Bees at the farm are quite essential for the best work in the horticultural department.

Swine.—No swine have been kept so far, but a few pigs will be taken on as soon as buildings can be obtained for their accommodation.

FIELD HUSBANDRY.

Owing to the newness of the Farm, no definite rotation experiments have been carried on. The great work has been an attempt to clear the farm of weeds, and during the war period to provide as much food material as possible. One block of 60 acres, which had been in summerfallow the year before, was sown to Marquis wheat, and yielded slightly over 30 bushels to the acre. This yield was considerably better than the average in southern Manitoba, though somewhat injured by frost and blowing in early season. Another 100 acres was seeded to oats and barley, which, in the case of the oats, yielded abundantly, and with the barley, fairly well. These coarse grains were used as hay and feed at the Station for the stock kept there.

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A considerable area was given to the culture of corn of the varieties "North-western Dent" and "Minnesota No. 13." The season was not favourable for corn, yet in late season it grew well, but in no case approached maturity. The new silo was filled, about 100 tons, and has been used for the winter feeding of the steers. This ensilage, though not of the best quality, has been greatly relished by the cattle, except for a small amount around the sides of the silo.

HORTICULTURE.

The 90 acres given over to the horticultural department were all occupied with either orchard or garden in 1918. The grounds in the department are beginning to take on something approaching a permanent character. Large areas were given over to the vegetables and the production of seed, further mention of which will be made under its proper heading.

It has been the policy of the Station and is now, to emphasize the horticultural work carried on there. The development of fruits and vegetables suited to the prairie is a line of work to which little attention has been given in the West. Just what can be done along these lines is not well known, and it is the aim of the Station to find out. Already we are beginning to speak with some confidence concerning many of these. Much work remains to be done, not only in sifting out a foundation stock from the old standard varieties, but in the introduction of new stocks carrying the hardiness necessary for success in the northwest. We are satisfied that by no manipulation of the plant breeder can a tree, vegetable or flower be made hardy except as it carries with it hardy blood.

The land in the horticultural department is level or nearly so, of rather a heavy type—in fact too heavy for horticultural work, but of such a character that heavy yielding crops may be produced when the soil is properly handled. It is especially well stored with nitrogen, so that in seasons of abundant rainfall all crops take on a very leafy and succulent growth, not easily restrained. Potato tops as tall as a man were quite common this past season, and such growth was noticeable all over the horticultural area.

The entire Farm, when taken over, was especially weedy. Much summer-fallowing has been done, but the fight against the weeds is almost constant, and the cost of production thereby rendered high; but some progress is being made. If the policy of the past season is followed for some time to come, the Station will be rendered comparatively free from weeds.

As is well known, the Farm, when purchased, was a stretch of bare prairie. It was wise that it should have been so, for one of the lessons to be taught was, that even the western prairie had possibilities from the horticultural standpoint. Shelter belts of such hardy shrubs as had proven their worth under similar circumstances, were set at the start, and a similar planting continued year by year ever since. Some of this planting has acquired considerable growth, and is affording much shelter even at this time. All of the shelter material made excellent growth during the past season, and is rapidly becoming the wind-break sought for.

THE LARGE FRUITS.

The orchard work was much extended during the season, about 1,200 young trees again being set, and in such a way as to connect the orchard set in 1917 with the first planting done on the Farm. This necessitates the use of several miles of Caragana hedge, which was used as heretofore. These fruit trees were seedlings of hardy varieties, crosses and standard trees of some of our more promising sorts, including many which have been introduced by the Central Experimental Farm, together with Russian varieties. Considerable planting was also done, using seedlings from the

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Modern Nursery of hardy apples as well as some of the more promising native plums from the western region. These young trees, as has been mentioned, did well. The loss during the summer was certainly not more than one per cent. It was found that that orchard set in 1917 had suffered much during the winter. Probably this was more or less due to the fact that the trees had made no growth during the previous summer, though given much care and attention. In the first block set, the loss was not great. The most of the standard trees were not only alive but doing fairly well, and the growth during the past summer quite sufficient. In fact 18 or 20 inches of new growth was quite common. It was noticed that the nursery stuff on the south side of the Caragana hedge in almost every case was killed, while on the north side the trees of the same varieties were thrifty enough. This was all contrary to what one would naturally expect, and was a surprise to the writer. However, it would seem that the sun's rays on the south side of the hedge had started the buds in early season, so that they froze solid during the next cold night, while on the north side the buds were held back. This fact is one worthy of notice on the prairie.

THE SMALL FRUITS.

The small fruit plantation was given a considerable amount of attention. In the test plots the breaks in the rows were carefully filled in with their varieties, and records kept of their behaviour. It would seem that with proper care the raspberry has a great future in the province. Certainly many varieties are not well suited to the province, but others do very well. Among those which do the best with us are "Herbert," "Sunbeam," "Minnetonka," while others have possibilities in them. The "Turner" appears like an exceptionally hardy variety, but the fruit is not of the best. The red currants also promise well. Among the newer varieties "Diploma" is an exceptionally large berry with large bunch. The black currants and gooseberry have not done well in the past, but the writer looks for a better return during the coming season. The return in quarts from some of the raspberries spoken of was quite the equal of that from the same crops in the East. A half acre or so of raspberries, largely of the "Sunbeam" and "Herbert" varieties, was set, with the expectation of making of this phase of the work a commercial proposition. It was also intended to set a large area of strawberries, but as it was impossible to obtain desirable plants in the right quantity, the idea was postponed for the season. The raspberries set, however, made especially strong growth, and promise well for next year. The canes of all this small fruit planting have been turned down and covered with soil; this has not been found necessary during all seasons, but is a sort of insurance, which, taking the years together, has been found to pay.

VEGETABLES.

More attention was given to vegetable production than at any former year. Beside all the work performed with the testing of varieties and cultural experiments, large acreages were given to peas, beans, potatoes and corn. The potatoes under field test yielded over 500 bushels to the acre, while in the test plots some of the varieties yielded over 700. The year's work would indicate that southern Manitoba has a great future as a potato producing section, especially for seed.

The seasons are slightly too short for the best success with beans, yet certain early varieties are being developed, which will suit conditions in the province. The beans yielded about 20 bushels to the acre, which after being hand-picked, are being offered for seed. About 200 bushels of these beans were produced.

Garden peas also occupied several acres. Some of these were put on the market as green peas, and others carried to maturity. Spinach, radish and other seeds were grown in considerable quantities. This work would indicate that seed production, so far as many of the vegetables go, is quite possible, and may be made a profitable industry.

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FLOWERS.

Many of the hardy annuals were grown in hotbeds and transferred to the open. The showing was especially good in late season. The asters, stocks, larkspur and many of the standard varieties were a great delight to the many visitors at the Farm. Small Caraganas were planted around the beds in an attempt to save them from the blowing sand, and answered well. Little work has so far been done with the perennials, but a start is being made this year.

FARM IMPROVEMENTS.

The new sheep shed was completed in early spring, and has been found a most useful building. The building is simply boarded with single rough boards, and 2-inch battens over the cracks. The feed room and lambing room at one end of the building serve their purpose well, and the entire building has served as a model to some visitors.

A new implement shed was built during the season, and in sufficient time to house our Farm implements for the winter. This building was greatly needed at the Station, for the implements were practically out-of-doors. The building was constructed along lines of an exhibition circular sent out by the Central Farm.

A silo of sufficient size to hold 100 tons of ensilage was erected in sufficient time to care for the corn crop. Owing to the fact that stave silos had not stood the wind test in southern Manitoba, the so-called crib silo was built on the elevator plan. These have stood, in all cases, where they have been put up in this section. To add to the strength of the building, and especially to help make it air-tight, the silo was lined with cheap lumber on the inside. When the structure is sided we believe that it will make one of the most satisfactory silos that we have seen in the western country, and just as attractive as any. All of these buildings were given two coats of paint following the colour plan which has been adopted at the Station, namely, a colonial yellow on the side wall with a dark green trim.

Other improvements which may be mentioned are a platform scale, and a well in the sheep pasture. The Station was very fortunate concerning the well. At 16 feet the flow of water was sufficient for all purposes, and though hard, not injurious to stock. On some of the adjoining farms water, fit for any purpose, has not been found.

Roadmaking.—In co-operation with the town some gravel was hauled and the present roadway to the Farm greatly improved. We hope very soon to be able to lay out the permanent roadways, and the approach to the Farm, by extending the main street of the village to and through the grounds.

Barnyard.—Some gravelling was done in the barnyard, but it still requires much work done to make it what it should be.

Fences.—The fences on the Farm were completed so that we are able to report all fences in first-class condition. Woven wire fence with cedar posts, with strand of barbed wire on top, has been used, making the fence all that could be desired.

EXCURSIONS AND VISITORS.

The community picnic was held at the Farm as usual, and proved a success. Not much was attempted in the way of speech-making, except from the Hon. V. Winkler, but the picnic spirit was emphasized, and a good day was enjoyed by all present. The visitors were treated to raspberries grown on the Farm, and much interest shown in

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the fruits, flowers and general work of the Station. The Motor League, at the time of the Chautauqua, also visited the Station, together with many visitors day by day. The acting superintendent has not been able to visit the farmers in the outlying sections as much as he would desire, but he has spoken at the farmers' week in Winnipeg, and a number of times in the churches of Morden village. The war has affected the Experimental Farms as much as other lines of work. Each person engaged at the Station has tried to fit himself into various capacities with more or less success. The future for the Experimental Station at Morden is brighter than it has been. We hope to see rapid development during the years to come.

EXHIBITIONS, ETC.

An exhibit of some magnitude was put on at the Agricultural Fair at Morden, but help could not be secured to extend the work through the province. The Horticultural Fair also held in Morden village received considerable attention from us. The exhibit put on by the Station was large, and consisted of fruits, vegetables and flowers grown there.

The Station also co-operated with the province to some extent in sending an exhibit to Kansas city. The exhibit won first place as being the best and most artistically arranged of any in competition with all states and provinces.

The Station also had the honour of supplying the vegetables and a few of the small fruits to the Governor General and party during their visit to Morden. The Farm received a brief visit from the vice-regal party, but it was too short to show the work of the Farm to much advantage. A set of photographs was, however, presented for display in the car, and through them we hope to advertise the Station and its work to some extent.

EXPERIMENTAL FARM, BRANDON, MAN.

REPORT OF THE SUPERINTENDENT, W. C. McKILLICAN, B.S.A.

The season of 1918 was the poorest from a crop production standpoint of any in the history of the Farm with the possible exception of one of the seasons in the 80's just after it was started. The rainfall in 1917 had been abnormally low and very little moisture remained in the soil. The spring of 1918 was very early and seeding was general in the first week of April. Spring crops started well, but high winds did a great deal of damage. The crops on the Farm escaped the blowing out which was general in the district but were burned up badly by the hot winds of June. The rainfall was very deficient, and that, combined with excessive wind, made a light crop of all farm products. The rainfall was greater than in 1917 but on account of it being the second year drought, and other conditions being unfavourable, the crop showed drought effects to a much greater degree.

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METEOROLOGICAL RECORDS FOR BRANDON, 1918.

Month.	Temperature F.			Precipitation.			Heaviest in 24 hours.	Total Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.		
	°	°	°	Inches.	Inches.	Inches.	Inches.	Hours.
January...	-4.6	28.5	-41.0		3	0.30	0.10	93.0
February.....	0.9	39.5	-38.0		9	0.90	0.40	132.3
March	28.0	64.2	-6.5	0.07	6	0.67	0.60	167.3
April.....	41.5	74.0	12.0	0.67	1	0.67	0.21	195.0
May..	46.1	92.0	11.0	2.34	$\frac{1}{2}$	2.39	0.81	172.6
June.....	60.8	101.8	32.0	0.97		0.97	0.30	202.0
July.....	60.6	97.0	37.0	2.47		2.47	1.09	225.0
August.....	60.4	87.0	37.8	2.09		2.09	0.71	221.6
September..	46.3	80.0	26.0	1.33		1.33	0.46	211.0
October.....	42.3	70.2	20.0	0.96	$\frac{1}{2}$	1.01	0.33	141.4
November.....	26.1	48.8	2.9	0.45	6	1.05	0.12	74.1
December.....	10.0	36.4	-36		5	0.50	0.30	52.5
Total for year.....				11.35	31	14.35		1,887.8
Average for 10 years				12.10	46.20	16.60		1,646.6
Total for 6 growing months, April to September.						9.92		1,227.2
Average of 10 years for 6 growing months, April to September.....						11.84		1,267.6

LIVE STOCK.

Horses.—There are twenty-one horses on this Farm on March 31, 1919. Four of these are pure-bred Clydesdale mares, thirteen are work horses, one a driver and three colts. Two of the Clydesdale mares raised foals this year, the other two being too young. Three Clydes and a young grade mare are in foal again this season.

No experimental feeding was done with horses. A record was kept of the feed used by each horse and it was found that the cost of feeding a working gelding for a year at present feed prices was \$190.39.

Cattle: Dual Purpose Shorthorns.—The herd consisted of 47 pure-bred Shorthorn cattle and four grades. The milk records of the cows completing milking periods during the year are not as high as in recent years. This is due to poor pastures and lack of the best grades of winter feed, incidental to the drought. However, even under these conditions, two cows produced over 9,000 pounds of milk in a year and most of the others gave over 5,000. The demand for young stock of milking strain continues to be very keen and quite a number of bull calves have been sold to farmers. The young bull "Dictator," bred by S. A. Moore, Caledonia, Ont., was purchased to continue this line of breeding. This bull has some of the best dual purpose breeding and is himself a good individual.

The cost of raising a calf up to one year of age was found to be \$77.02; the cost from one to two years, \$47.67, and the cost of feeding a mature cow varied from \$46.19 to \$92.87, depending on her milk production.

An experiment was conducted comparing a ration of which succulent feed (corn silage) was the principal part and the grain portion small with a ration in which there was little succulent feed but plenty of grain. Growing heifers were the kind of stock used. The results showed that much cheaper and better growth resulted from the first stated type of ration.

Sheep.—The sheep are seventy-one in number; fourteen pure-bred Oxford Downs, one Suffolk, one Shropshire, and the remainder grades.

The cost of feeding a mature ewe for a year was found to be \$12.19, and of raising a ewe lamb to one year, \$8.35.

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The sheep grading experiment which has been carried on since 1911 has been completed. Starting with a mongrel lot of range ewes at that time, by the constant use of an Oxford Down ram, a flock has been developed without any purchases of females, that is of uniform type, of good size and while their grade is still visible on close examination, they would pass casual examination as practically pure bred Oxford Downs. The object of the experiment was to demonstrate how quickly and easily improvement and uniformity could be obtained through the continued use of good rams of one breed.

This flock is now being used in a breeding test for the production of market lambs. Continued breeding with the Oxford Down is being compared with crossing with Suffolk and with Shropshire rams.

Swine.—The swine on hand on March 31 inclusive of young litters are, 20 Yorkshires and 20 Berkshires. Thirty-six pure bred sows have been bred for spring farrowing but a number of these are being sold to supply farmers who want to go in for improved breeding.

The cost of feeding a mature sow for one year was found to be \$41.40. The cost of raising a young sow from weaning to one year was \$29.74.

An experiment was conducted in which "Standard Stock Food" recleaned screenings were compared with barley as a feed for finishing pigs for market. As barley is generally accepted as the best grain for this purpose, this test was intended to find the comparative value of the recleaned screenings for this purpose. These feeds were compared both alone and in combination with mill feeds. The results showed that recleaned screenings were fully the equal of barley for this purpose.

Experiments were conducted with hog pastures. Rye, oats and barley, and rape were used, good results were obtained from all these and it was demonstrated that the cost of feeding growing pigs could be reduced at least 25 per cent by the use of such pastures. Peas and squaw corn were grown to maturity and "hogged off." The results in this experiment were disappointing and the experiment will be repeated before being reported upon.

Poultry.—The breeds kept are the Barred Plymouth Rock and the White Wyandotte. The pullets have been trap-nested and records kept of egg production. Selection of the best laying hens for breeding purposes is practised.

Bees.—Three colonies were wintered over. The dry season was not favourable for honey production but nevertheless a fair amount was gathered.

FIELD HUSBANDRY.

Rotations.—The following rotations have been under test at this Farm for a number of years:—

"D," four years' duration (wheat, wheat manured, oats, summer-fallow): This is purely a grain-growing rotation, except that manure is applied every four years.

"E," four years' duration (wheat, wheat, oats, summer-fallow): This is exactly the same as "D," except that no manure is applied and is a typical grain-growing rotation.

"F," five years' duration (wheat, wheat, corn or roots, oats or barley, clover hay): This is a mixed farming rotation suited to conditions where it is desired to grow both a large amount of wheat and a large amount of fodder for stock.

"G," six years' duration (wheat, wheat, oats or barley, clover hay, pasture, corn or roots): This is also a mixed farming rotation and allows for pasture for stock as well as cropped land.

"H," six years' duration (wheat, wheat, summer-fallow, oats, hay, pasture): This rotation provides both grain crops and hay crops, but omits hoed crop.

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"I," six years' duration (flax, oats, summer-fallow, wheat, hay, pasture): This rotation is of similar character to "II," but substitutes flax for one of the wheat crops.

"Q," eight years' duration (roots and peas, wheat or oats, hay, hay, pasture, pasture, pasture, green feed and rape): The land used in this rotation is light and gravelly and is therefore used as a sheep farm.

"W," ten years' duration (wheat, wheat, corn or roots, oats, barley, alfalfa, alfalfa, alfalfa, alfalfa, alfalfa): This rotation is adapted to a dairy or pure-bred stock farm where the chief object of crop growing is the production of a large quantity of good fodder.

The table which follows shows the average cost per acre of operating these rotations, including rent, use of machinery, and all the cost of handling the land and producing the crop (but not marketing). It also shows the average return per acre, and the resultant profit. These figures are based on normal pre-war prices; if present prices were used, much larger returns and profits would be shown.

Rotation.	Cost per acre of operation. Average of 5 years.	Returns per acre. Average of 5 years.	Profit per acre. Average of 5 years.
	\$ cts	\$ cts	\$ cts.
"D".....	10 19	11 99	1 80
"E".....	8 50	10 73	2 23
"F".....	11 93	15 98	4 05
"G".....	11 38	17 14	5 76
"H".....	8 89	12 22	3 33
"I".....	9 10	13 76	4 66
"Q".....	7 17	7 26	0 09
"W".....	10 38	15 85	5 47

Cultural Experiments.—Deep ploughing is giving rather better results than shallow, though the figures obtained are not as conclusive as would be expected.

One ploughing of summer-fallow is giving equally as good results as two and means less work.

The substitution of a pasture crop for bare fallow has reduced the following wheat crop. June ploughing of summer-fallow has proven much better than July.

In seeding down grasses, better results have been obtained where seeding has followed corn or summer-fallow, than where grain was the previous crop, and the larger the number of preceding grain crops, the greater the difficulty in getting a good catch.

Better catches are obtained without a nurse crop than with, but not enough better to pay for the loss of the grain crop.

In breaking up sod of tame grasses and clovers, best results have been obtained by breaking in July immediately after removing the hay crop and working as a summer-fallow during the remainder of the season.

In the application of barnyard manure on stubble land for growing wheat, oats or barley, best results have been obtained with all three grain crops by applying in the fall and ploughing in. The same result was also obtained in manuring for corn.

The substitution of grain crops ploughed in for green manure instead of bare summer-fallow resulted in a decrease in yield. Where the green crops were ploughed in early in July the yield was practically the same as on summer-fallow land, but later ploughed green manured land wasted too much moisture.

The results of a very extensive system of experiments with soil packers have been very inconclusive.

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Seeding in various depths from one to four inches has not resulted in any definite conclusions.

The application of commercial fertilizers of various types has brought no return commensurate with cost.

CEREALS.

The usual tests of varieties of cereals have been conducted. For the first time since the introduction of Marquis wheat, it has been excelled in yield by Red Fife. This was due to the peculiarities of the season, which favoured late varieties. On the five-year average Marquis has an advantage of over 11 bushels per acre over Red Fife.

Victory oats gave the highest yield of oats this year, but Banner has the highest five-year average, with Gold Rain a close second. Two rowed varieties of barley excelled six rowed, the variety known as Charlottetown No. 80 standing first. In five-year averages Manchurian has the highest yield. Tests of peas, flax and rye were also conducted.

FORAGE CROPS.

Corn and roots were a fairly good crop, late rains having helped them after other crops were past help. North Dakota White gave the largest yield of fodder corn this year. Northwestern Dent gave a satisfactory yield and had more and better cobs. Peerless Yellow mangels and Invicta turnips were the heaviest yielding kinds. Alfalfa stood the drought much better than any other hay crop with the exception of Sweet clover, which gave a higher yield of a poorer quality of fodder. Brome grass stood the drought best among grasses. Among crops for green feed, oats gave the best results.

HORTICULTURE.

A large number of varieties of vegetables were tested for the purpose of determining the most satisfactory for use in the home gardens of Manitoba, and much information along this line is available to inquirers. Cultural tests to determine the best methods of growing the various vegetables were also conducted. A large number of annual and perennial flowers are also tested. Tests were continued in the growing of fruits suitable for Manitoba.

BUILDINGS.

A new 100-hen poultry house was erected. The piggery, sheep barn and granary were painted brown, with white trimmings to match the new barns.

EXHIBITIONS AND EXCURSIONS.

An exhibit representing the work at the Experimental Farms was shown at Neepawa, Boissevain, Deloraine, Souris, Virden, Dauphin, and Gilbert Plains Fairs. At Manitoba Winter Fair competitive entries were made in some of the horse and swine classes and a creditable showing was made. Among the prizes won were championship for best bacon pig any breed, and reserve championship for Canadian-bred Clydesdale mare.

Thursday, July 11, was set apart as "Farmers' Day" at the farm. A very large crowd came to the farm, estimated at 2,500 people. They were shown the experimental work being done and a programme of addresses was provided.

Several other smaller picnics and deputations came to see the farm and thousands of individual visitors.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

REPORT OF THE ACTING SUPERINTENDENT, N. D. MACKENZIE, B.S.A.

The season opened early, seeding beginning on the 28th of March and being general the first week in April. However, the high spring winds, the lack of sufficient rainfall and summer frosts made the conditions very unfavourable for the production of maximum cereal and forage crops. Pasture and hay crops were exceptionally light, resulting in some farmers disposing of their surplus live stock in an unfinished condition.

METEOROLOGICAL REPORT, 1918-19.

Month.	Temperature.					Rainfall.		Snowfall.		Total Sun- shine.
	Maximum.		Minimum.		Mean.					
	Date.	°	Date.			Days.	Inches.	Days.	Inches.	Hours.
January	1	39	12	-40	-8.81			5	8.25	57.5
February	9	40	20	-37	8.82			3	7.25	85.3
March.	25	65	6	-12	27.35			5	8.75	134.9
April.....	9	75	25	10	39.87	4	1.56			176.3
May.....	4	86	12	15	45.19	4	1.29	2	4.25	175.2
June	10	98	5	28	59.60	3	0.82			247.8
July.....	18	96	24	31	61.65	8	1.96			242.8
August.....	8	90	13	40	61.23	10	3.02			221.9
September.....	7	84	18	13	47.70	2	0.67			168.1
October.....	3	73	31	15	41.68	3	0.57	2	0.50	117.2
November	15	57	22		26.43			1	6	79.0
December.....	7	37	31	-33	14.29			3	9	32.8
Total.....						34	9.89	21	44.00	1,738.8

HORSES.

The horses number twenty-seven, consisting of twelve pure-bred Clydesdale mares and one filly, fourteen work horses and grade colts.

Experiments have been conducted to determine the cost of wintering work horses, brood mares, idle horses and raising fillies. The following are the data arrived at:—

Work horses, \$26.35; brood mares expected in foal, \$19.49; brood mares not in foal, \$18.85; idle horses, \$12.87; two-year-olds, \$16.32; three foals (outside corral), \$12.24; filly (inside), \$16.11.

CATTLE—SHORTHORN (DUAL PURPOSE).

The herd numbers fifty-six, consisting of two stock bulls, five bull calves and forty-nine females. The herd is being strictly bred along dual purpose lines. By rigid selection, retaining only females conforming to beef type and milk production, and breeding to the best sires, many heifers are promising to become heavy milkers without menace to their production of beef.

Numerous inquiries have been received for young bulls of the dual-purpose type, so that our surplus is readily sold at good prices.

The average cost of milk production for the months of January, February and March is \$1.54 per 100 pounds.

SHEEP.

The flock numbers one hundred and twenty-four, consisting of flock rams two, ram lambs six; pure-bred Shropshires twenty-eight ewes and thirteen lambs; grade Oxford and Shropshire ewes and lambs seventy-four.

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Considerable success was met with in the breeding, one hundred and two lambs being obtained from seventy-five ewes, of which ninety-seven were raised.

Feed costs have been kept throughout the winter. The average daily cost of wintering pure-bred Shropshire ewes is 3 cents, grade Oxford and Shropshire ewes 3 cents, pure-bred Shropshire lambs 2.11 cents, grade lambs 2.36 cents and Shropshire rams 1.98 cents.

SWINE.

The entire herd numbers sixteen, consisting of eight Yorkshire sows, two Yorkshire boars and six Berkshire sows. Many inquiries have been received for young boars and sows, in consequence of which we were able to dispose of our surplus stock.

The daily cost of wintering sows outside cabins is 4.83 cents, young sows inside 4.52 cents. The cost to produce one pound gain, fattening hogs, is 6.25 cents and 6.82 cents.

POULTRY.

Two breeds of poultry are kept, viz., Barred Plymouth Rocks and White Wyandottes. These breeds are well adapted to the conditions prevailing in southern Saskatchewan. Line breeding has been followed with progress.

Poultry breeding is progressing throughout the province. Many orders have been received for hatching eggs and breeding stock, the latter considerably more than we could supply.

During the months October, 1918, to March, 1919, 1,106½ dozen eggs were laid, and sold at an average price of 44½ cents per dozen, realizing \$490.64. The cost of production was \$308.33, leaving a net profit of \$182.31.

One hundred and eighty-eight birds were crate-fed, realizing a profit of \$30.44.

FIELD HUSBANDRY.

The investigational work in field husbandry has been mainly rotation and cultural experiments. In connection with the former all records are kept to ascertain the cost of production of field crops and the suitability of the rotations for southern Saskatchewan.

Four rotations are under consideration, details of which follow.

Rotation "C"—three years' duration (summerfallow, wheat, wheat). In the grain growing districts this rotation is generally practised.

Rotation "J"—six years' duration (summerfallow, wheat, wheat, oats seeded down, hay, pasture).

Rotation "P"—eight years' duration (summerfallow, wheat, wheat, summerfallow, hoed crop, barley seeded down, hay, pasture).

Rotation "R"—nine years' duration (summerfallow, hoed crop, wheat, oats, summerfallow, wheat, oats seeded down, hay, pasture).

CROP YIELDS.

Wheat—The yields of wheat varied between 45 bushels and 23 pounds on summerfallow and 7 bushels and 55 pounds on stubble land.

Oats—80 bushels and 23 pounds on summerfallow, and 15 bushels and 17 pounds on stubble land.

Barley—50 bushels and 27 pounds on summerfallow, and 20 bushels and 23 pounds on stubble land.

Field peas—24 bushels and 43 pounds.

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CULTURAL OBSERVATIONS.

Deep ploughing, e.g., 8 inches, gives the largest yields, which yields are augmented by subsoiling, the increase being more apparent on the stubble crop.

Ploughing summerfallow twice is not necessary when land is ploughed early and of a depth of 6 to 8 inches. Autumn ploughing of stubble gives a larger yield. Fall cultivation and spring ploughing for oats has given the largest yield, this being more so when the previous summerfallow was ploughed early and deeply.

Seeding to grass after a hoed crop or summer-fallow is the only means of insuring a good catch.

Break sod early and work as summerfallow.

GENERAL WORK.

The regular work on variety tests was conducted on one-fortieth acre plots. Twenty-one varieties of wheat, twelve of oats, twenty-one of barley, seven of peas and three of flax were tested. Red Fife gave the largest yield of 45 bushels and 20 pounds. Victory, Ligowo and Danish Island oats gave an equal yield of 102 bushels and 32 pounds. Of the barleys Swedish Chevalier gave the highest yield of 58 bushels and 16 pounds. MacKay peas yielded best, 41 bushels and 20 pounds. The flax was a total failure.

FORAGE CROPS.

Corn for Ensilage.—The summer rains came in good time to insure a normal yield of corn for ensilage. The variety grown was North West Dent, which variety is best adapted to local conditions. The yield per acre was $9\frac{1}{2}$ tons.

The selections of the Mandan corn were a complete failure owing to the seed arriving rather late, resulting in immature corn being caught by the fall frosts.

Roots.—Five varieties of turnips, three of mangels, three of carrots, four of sugar-beets, were tested. On account of the high spring winds considerable of the seed was blown out, this being followed by lack of moisture during the early summer the yields were poor.

Clovers and Grasses.—Owing to the unfavourable conditions during the past season no data have been derived from the investigation with clovers and grasses.

HORTICULTURE.

The fruit crop was practically a failure, caused by spring and summer frosts. Cross-bred apples set very little fruit. Plums set well but were frozen before ripe. Small fruits set a light crop which was badly injured by the hot June winds.

VEGETABLES.

The usual variety tests and cultural experiments were discontinued and the work confined to the production of vegetable seed. On June 10 hot winds almost totally destroyed the garden and very little results were obtained. However, a fair crop of radish, parsnip and spinach seed was harvested. Potatoes did not promise well during the summer but the rainfall during August brought the crop on so that the yield and quality were well up to the average.

Annual and perennial flowers were quite satisfactory and gave a good show of bloom.

Trees wintered well and made a good growth.

Ornamental shrubs were affected by the frosts and produced very little bloom.

EXPERIMENTAL FARM. ROSTHERN. SASK.

REPORT OF THE SUPERINTENDENT, WM. A. MUNRO, B.A., B.S.A.

THE SEASON.

The season of 1918 was deficient in moisture and especially during the latter part. On July 27 there was a rain amounting to 1.4 inches and during the remainder of the season there was not a shower amounting to more than 0.15 inches. Owing to small moisture during the early part of the season there was considerable soil drifting on land that had been summer-fallowed in 1917, or that had been fall ploughed in 1917 and worked down to a fine seed bed. The hay crops were very light but grain and root crops were quite up to the average.

On July 25 the temperature registered 30.6. This did no perceptible damage on the Experimental Station, at the time, other than discolouring the foliage of tomatoes and potatoes, but at harvest it showed its effects on the winter rye which was very much shrunken. This is the first time here that winter rye has been anything but a good crop.

Following is the weather record for the year ending March 31, 1919:—

WEATHER OBSERVATIONS taken at Rosthern Experimental Station.

Month.	Temperature F.			Total Precipitation.	Total Sunshine.
	Highest.	Lowest.	Mean.		
1918.				Inches.	Hours.
April.....	73.1	10.2	41.12	1.65	235.5
May.....	79.2	20.2	45.08	1.26	226.2
June.....	98.7	32.9	61.68	0.93	274.2
July.....	94.6	39.6	61.73	2.50	310.2
August.....	84.3	37.8	62.03	0.42	280.7
September.....	81.2	17.3	49.58	0.23	233.2
October.....	68.8	5.3	40.155	0.34	150.7
November.....	53.0	4.2	26.1	0.3	110.2
December.....	41.9	-27.3	12.45	0.55	59.1
1919.					
January.....	40.8	-29.5	11.22	0.75	101.9
February.....	27.9	-44.8	-2.27	0.6	131.4
March.....	39.7	-33.5	6.58	1.6	192.7
Total.....				11.13	2,326.0
Average for years 1912-13-14-15-16-17.....				14.88	2,195.8
Total for five growing months April to August 1918				6.76	1,446.8
Average for five growing months, 1912-13-14-15-16-17.....				9.375	1,309.13

LIVE STOCK.

Horses.—In addition to the sixteen horses reported last year, there have been purchased two pure-bred Clyde mares and one of the drivers has been exchanged for a pure-bred Clyde mare. Besides this we have raised two colts. The stock of horses on hand now includes seventeen work horses, one driver, and two yearlings. Of the seventeen work horses, eight are grade Clyde mares and three are pure-bred Clyde mares. Six of the grade mares are in foal.

With sixteen horses for the regular work on the farm, and one extra with the driver for the garden there is ample horse power for the requirements for the Station.

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Cattle.—The herd of cattle on the Station has increased to eleven cows and one bull and eight heifers and calves, most of which are pure-bred Holstein. This, it is hoped, will furnish the nucleus of a creditable dairy herd in the near future.

For the fifth time we have bought steers in the fall, and after feeding them till April or May sold them with good profit. In 1917 there were three carloads bought. Forty were two and a half years old and twenty were three and a half years old. Each carload was weighed and fed the same amount of oat and barley chop and hay per weight of steer, and it was found that the older steers made the greater gains and sold for the higher price, but showed the least profit because they cost \$1.25 per hundred pounds more than the younger steers at the time of purchase. If three-year-old steers of the same type and condition could be purchased at the same price per hundred as two-year olds, the older ones would make profitable feeders.

In November, 1918, forty-six two and a half year-old steers were purchased on the Winnipeg market. They were fed in two lots as evenly as we could divide them. They were fed the same amount of hay and oat and barley chop, and one bunch was fed in addition ten pounds turnips daily, per steer. Those fed the turnips made a total average gain of 295 pounds per steer as against a total average gain of 263 pounds per steer made by those not fed roots. At selling time a spread of fifty cents per hundred was made in favour of those fed roots. Counting the increase in amount of gain and increase in quality, the roots had a feeding value of \$18 per ton.

Sheep.—A flock of one hundred ewes of inferior mixed breeding was purchased in December, 1915, for approximately one thousand dollars and two splendid Leicester rams costing \$50 each were put with them. The gross returns for mutton and wool in 1916 was \$800, in 1917 \$1,200, and in 1918 \$1,250, and we have left a much larger flock, and a flock of much superior quality to the one we began with.

Hogs.—A start was made in hogs in the autumn of 1917 by obtaining six sows and one boar of good Berkshire breeding. From these there were raised forty pigs. There were ten brood sows carried over winter in 1918-19. An experiment was planned to determine the comparative values of pastures, but owing to difficulty in obtaining fencing the pigs were run together on various pastures including rape, barley, sweet clover and oats. The total realized for the product of the six sows and one boar in one year was \$1,475.

FIELD HUSBANDRY.

A change has been made in the arrangement of the farm by which forty-five acres are devoted to the work of variety tests in grains, legumes, fodder crops, and potatoes. Heretofore these tests have been conducted on summer-fallow alone, but now they can also be carried out on land that had been cropped the previous year. Many of the trial plots in grain were either blown out or buried with drifts from other parts so that there was very little accomplished in the way of deductions as to the comparative yields of different varieties. However, even under such adverse circumstances, Red Fife and Marquis headed the list of all varieties of wheat in point of yield. In oats, Gold Rain yielded highest for the first time since records were kept, with Twentieth Century, Banner, O.A.C. 72, and Victory not far behind. O.A.C. 72 has been tried for three years and is consistently high in yield, but is late in maturing and liable to be caught with the early frosts.

The comparative yields of barley in 1918 were very different from those in former years. For a number of years O.A.C. 21 was highest, but in 1918 it was eighth. The three highest yielders in 1918 were Taganrog, Swedish Chevalier, and Early Chevalier.

Rotations.—Owing to a change in the direction of the rotations in 1916, the relative values of different rotations could not be fully determined by 1918.

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because the effect of such crops as hay or hoed crops cannot be fully realized until after a number of years. It is a notable fact that, in dry years, rotations involving hay and corn do not give as high returns as rotations involving only grain. The yields of corn and hay are not sufficient to warrant the growing of these crops. But, in wet seasons, on the other hand, the returns from the rotations involving hay are much greater than from those involving grain alone. An important consideration in point of raising hay is the fact that during the high winds of the spring of 1918 no part of the farm in which grass had been grown at any time the past ten years suffered from soil drifting, whereas most of that which had not grown grass suffered severely.

Cultural Investigation Work.—The location assigned to cultural investigation work in 1911 proved unsatisfactory after a number of years owing to unevenness in the quality of the land, which could only be determined after trying it for a considerable period. In 1917 a new location was selected, which gives every evidence of uniformity. There was little accomplished in the way of experiment in 1918 because of the short time on the new location, but one experiment was outstanding in its results. The effect of barnyard manure applied to summer-fallow on the following wheat crops gives the most pronounced results, both in the growing and in the yielding, of any experiment we have tried. The effect is also carried through to the oat crop of the next year. The yield in 1918 of wheat on fallow that had been manured was 46 bushels per acre, as against 31½ bushels per acre on land that had been fallowed and no manure applied.

FODDER CROPS.

Hay.—The average yield per acre of hay on thirty acres in 1918 was 1,628 pounds. This was Western Rye grass, half of which had been seeded in 1917 and half in 1916. This yield is quite up to the average for the past eight years, and seems scarcely large enough to justify the growing of hay. But there is the effect of binding the soil, which must not be lost sight of. Soil drifting is a menace which frequently affects this district, and it has been demonstrated on this farm that soil which is seeded to grass once in six years or oftener and left in sod for two years does not drift.

Roots.—Mangels, sugar-beets, carrots and turnips have been tried for a number of years, and it has been found that mangel seed does not germinate satisfactorily. Sugar-beets do not yield well. Carrots require labour in thinning and harvesting inconsistent with the returns, but turnips have yielded well every year they have been tried. On the trial plots in 1918 there were four varieties which yielded over ten tons per acre, Hall's Westbury yielding the highest, 10 tons 886 pounds per acre. Hall's Westbury has been consistently the highest yielder during the past nine years, and is also superior to all the others in point of quality. On a five-acre field this same variety yielded in 1918 at the rate of 10¾ tons per acre.

HORTICULTURE.

During 1917 the trees and shrubs had almost completely recovered from the damage done by the hail storm of 1916 and by the spring of 1918 were in approximately the same condition they had been in two years previously. The evergreens had suffered most. In many cases the leaders were broken and only careful pruning and training could a lateral be utilized to maintain the shape of the tree. All shrubbery made good growth during the summer of 1918, but a great deal of killing was done the following winter. In many cases the killing back was done long before the winter had really set in. There was rank growth till August and evidence would go to show that the new growth was not hardened enough to withstand the early frosts of September. This killing in early autumn applied more especially to fruit trees, young poplars, and many of the ornamental trees.

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The success of gardening in this district largely depends upon effective wind-breaks. Russian poplar and maple serve this purpose fairly well, but the one outstanding plant for this purpose is the Caragana. It withstands drouth, hail and bad winters and is never affected with insect pests. It grows quickly from seed and requires little attention more than being kept cleared of grass. The seed may be sown in the fall or spring and the next year thinned to one or two feet apart. It should be planted so as to form blocks of garden of about one hundred feet each in width east and west by two hundred feet in length north and south.

Fruits.—An experiment has been under way for a number of years to secure a hardy apple that is at the same time of good quality. We have a few varieties of seedlings that have proved hardy for six years but which have not yet come into bearing.

A large number of plums set out in 1915 are proving hardy but have not yet come into bearing. The fact that several farmers in the district have been growing plums for a number of years indicates that there are good possibilities for the development of plum culture in this part of the province.

Small fruits have yielded profitably every year since they came into bearing in 1914. Following are the varieties recommended:—

Black currants.. . . .	.. Climax, Eagle.
Red currants.. . . .	.. Stewart, Rankin's Red.
White currants.. . . .	.. White Cherry, White Grape.
Raspberries.. . . .	.. Herbert.
Strawberries.. . . .	.. No. 3 June bearing.

Vegetables.—Cabbage, cauliflower, and celery yielded well in 1918. Trouble is often expressed with respect to growing celery, but we have managed it successfully for seven years. The plants are started in a hot bed, pricked out into a cold frame and transplanted to the garden by the first week in June. They are planted on the level (not in trenches) six inches apart in the rows with six feet between the rows, and kept clear of weeds. No bleaching is attempted till nearly the end of August when the plants are mounded with earth till only the top leaves are exposed. If there is danger of frost they are covered at night with straw and uncovered in the morning, and by the middle of September the celery is ready for use. It is then lifted and planted about four inches apart each way in about four inches of earth in a cool dark cellar and used during the winter.

Tomatoes are a questionable crop any year, and ripe tomatoes very rare. In 1918 there was a poor yield owing to the blight of the blossom due to cold nights.

Roots including parsnips, turnips, radishes, beets and carrots yielded well in 1918. Corn was a failure except in the case of one variety, Peep O'Day, which came to sufficient maturity to ripen.

EXPERIMENTAL STATION, SCOTT, SASK.

REPORT OF THE ACTING SUPERINTENDENT, M. J. TINLINE, B.S.A.

THE SEASON.

The spring of 1918 opened favourably and seeding was possible by April 10. The surface soil was in good tilth but there was little moisture in the subsoil owing to the drought during 1917. Winds were unusually prevalent during the spring, consequently evaporation was excessive. In addition the soil drifting caused by the winds cut the leaves of the young growing plants.

The prolonged drought continued into 1918 and only one rain of material benefit to crops was recorded on the Station and this came in late July. In the northern part of northwestern Saskatchewan there was more moisture and more vegetable growth.

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Unfortunately frosts July 24 and 26 caught much of the wheat in this northern section in the flowering stage rendering the wheat crop only fit for hay for which there was a good demand from the farmers in the drought stricken regions south of the main line of the Canadian Pacific Railway.

In the districts where the crops escaped the frost the rain of 1.58 inches on July 27 was most beneficial. The grain plants had wilted down so that each plant had on an average about one single ear bearing stalk. After the rain the stools revived and bore heads, but unfortunately the frosts in early September froze the stools before any kernels except barley became of sufficient size to make feed. The heads on the plants formed before the rain while very short, produced grain of good quality. The additional forage from the second growth was most welcome for feeding stock.

The drought continued throughout the balance of the season and the crops harvested were the lightest in the history of this part of Saskatchewan, varying from no crop at all to yields of from 10 to 12 bushels of wheat per acre.

The ground was frozen too hard to plough in late October but the weather continued mild well into the winter.

METEOROLOGICAL RECORDS, 1918-19.

Month.	Temperature F.			Precipitation.				Total Sunshine.
	Highest.	Lowest.	Mean.	Rainfall.	Snowfall.	Total.	Heaviest in 24 Hours.	
1918.	°	°	°	Inch.	Inch.	Inch.	Inch.	Hours.
April.....	75.0	3.2	41.2	0.55	0.25	0.80	0.30	241.3
May..	80.0	15.6	45.2	0.18		0.18	0.08	252.9
June.....	95.4	27.2	51.6	0.24	0.05	0.29	0.06	314.8
July.....	98.0	27.2	61.6	1.87		1.87	1.58	323.4
August....	93.0	35.2	61.2	0.93		0.93	0.30	266.3
September .	82.0	17.2	45.8	0.19		0.19	0.12	177.6
October .	70.6	8.2	40.04	0.32		0.32	0.32	113.7
November.....	49.0	- 3.2	25.76		0.10	0.10	0.08	111.0
December..	38	-28.8	12.73		0.275	0.275	0.100	96.3
1919.								
January ..	41.0	-23.8	14.28		0.725	0.725	0.425	79.1
February..	37	-45.5	- 2.4		0.3	0.3	0.2	89.7
March ..	38.5	-33.8	5.14	.....	0.9	0.9	0.5	168.7
Total for year...				4.28	2.6	6.88		
Total for six growing months, April to September.						4.26		
Average for eight years.....						13.58		
Average for eight years for six growing months, April to September.....						10.64		

LIVE STOCK.

Horses.—There are sixteen head of horses on the Station; of these six have been raised and in addition one team of young geldings has been sold during the year at a good figure. The experimental work has consisted in securing data on the cost of feed for work horses, and the cost of raising horses.

Cattle.—Nineteen steers fattened during the winter of 1917-18 were sold in May at an advance of \$50.53 per steer over autumn prices. The net profit per steer amounted to \$17.77. Steers fed in a straw shed gained in flesh more rapidly than steers fed in a corral, with an eight-foot tight board fence and with a frame shed open on the south side for shelter. Ten steers that were hornless at the time of purchase made an average gain of 119 pounds, while eight steers dehorned in November only made an average gain in the same period of 64 pounds. Owing to the shortage of all kinds of feed, no winter feeding experiments were conducted during the past season.

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The only cattle on the Station at the present time are one milch cow and one heifer, both grade Holsteins.

Sheep.—The flock of sheep was valued on April 1, 1918, at \$1,753. Sales of wool and mutton totalled \$1,396.11. Increase in value of \$563, less purchase of one ram, \$50, makes a gross return of \$1,909.11.

The experiments with sheep consist of grading up, using range ewes and Shropshire rams for foundation stock, testing out breeding ewe lambs and a comparison of oats and barley with standard screenings for wintering lambs. The lambs fed screenings made the most economical gains. The roughage for the sheep consisted of wheat hay supplemented with oat sheaves in the late winter.

Swine.—The swine on the Station are pure-bred Berkshires. Small portable cabins are used for housing for both summer and winter. Alfalfa gave early spring pasture, while Western rye grass and rape were pastured during the latter part of the season. An average of eight pigs per litter were raised and used in the feeding experiments. The main experiment was a comparison of the self-feeder with the open trough method in feeding out of doors. Four tests were made during the year. The average daily gain per pig from all the tests from the self-feeder lots was 1.98 pounds. While the daily gain from the pigs fed in the troughs only amounted to 1.32 pounds.

A comparison of the number of pounds of grain to make one pound of gain showed that an average of 4.46 pounds was required in the self-feeder lot and 5.27 in the trough-fed lot.

In all 71 fat hogs were marketed. One two-year-old boar was sold and replaced with a younger animal of different blood. At the end of the year there are 10 young brood sows and 1 boar on hand.

POULTRY.

Four colony houses for poultry have been erected. The stock now consists of 197 birds principally of the Barred Rock breed. One pen of Buff Orpington pullets from eggs purchased to fill the incubators were selected out and kept for breeding. The equipment consisted of two Tamlin and one Prairie State incubator; to these has been added an Essex Model. A Candee coal-burning brooder has been used in one of the colony houses for rearing the chicks, with satisfactory results. Owing to the war regulations the feed has consisted mainly of oats and barley. Some bran and wheat screenings have been used, also beef scrap, oyster shell and roots.

The main experiments have been a comparison of hens versus pullets for egg production and fertility of the eggs. Records have been kept of the hatches secured from the different types of incubators and from the eggs set at different periods of the hatching season. Crate fattening was tried with profitable results. A comparison of early, medium and late hatching pullets for winter eggs has demonstrated the advisability of having March and April hatched birds.

FIELD HUSBANDRY.

Rotation of Crops.—The following rotations have been under test on this Station for a number of years:—

“C”—Three years’ duration (summer-fallow, wheat, wheat).

“J”—Six years’ duration (summer-fallow, wheat, wheat, oats (seeded down), hay, pasture).

“P”—Eight years’ duration (summer-fallow, wheat, wheat, summer-fallow, peas, barley (seeded down), hay, pasture).

“R”—Nine years’ duration (summer-fallow, peas, wheat, oats, summer-fallow, wheat, oats (seeded down), hay pasture).

In seeding down, 10 pounds of Western rye grass, three of Red clover and three of alfalfa are mixed with sufficient seed grain for one acre and sown with the grain drill. While good catches of clover that have wintered over have been secured, the growth of clover has usually been weak due to lack of moisture.

The rotted barnyard manure has been ploughed under during the summer-fallow year; in the two rotations including peas the manure was applied at the rate of 15 tons per acre.

The following table shows the average cost per acre of operating including rent of land, use of machinery, cost of working the land and handling the crops. In addition the average returns per acre and net profit per acre are included. These figures are based on pre-war prices and cover a period of six years.

Rotation.	Average cost per acre for six years.	Average returns per acre for six years.	Average profits per acre for six years.
	\$ cts.	\$ cts.	\$ cts.
"C"	7 17	11 25	4 08
"J"	6 89	12 19	5 30
"P"	7 82	11 14	3 32
"R"	7 69	12 58	4 89

Rotation "J" has consistently given the highest net profits per acre during the time the rotations have been in operation. This rotation is now used on the larger fields on the Station.

CULTURAL EXPERIMENTS.

In the Cultural Investigational Work the prairie breaking experiment is now well on the way to completion. The sod land reserved for this experiment has all been broken up, consequently, the part of the experiment remaining is to determine the effects on succeeding crops of the different systems adopted in breaking the land. The average yield per acre for a four year period of green feed grown on spring breaking is approximately one ton per acre. The average yield for flax grown under similar conditions is a little more than eight bushels per acre. After taking these crops off, the land has been back-set in the fall and worked down and sown to wheat the following year. The average yield of wheat after the green feed for a five year period is 14 bushels and 41 pounds per acre and after flax 16 bushels and 41 pounds. During this same period land broken four or five inches deep during the summer and cropped the next year has given an average yearly return of 21 bushels and 49 pounds, while the yield from land that was broken shallow and back-set has been 20 bushels and 35 pounds.

Rates of Seeding.—Rates of seeding experiments have been carried on with wheat, oats and barley commencing with three-quarters of a bushel of wheat and running up to two bushels and with one bushel of the other grains and running up to three bushels. The season being so exceptionally dry the lighter seedings have generally given the heaviest crops.

Dates of Seeding.—In the dates of seeding experiments the early sown barley and oats were damaged by the spring frosts. Notes taken in the spring show that the grain crops withstood the spring frosts in the following order: wheat, spring rye, oats, barley, flax.

CEREALS.

The yields from the cereal tests and from the seed plots were unusually low owing to the drought. Seventeen varieties and strains of wheat were grown in the uniform test plots and of these the Marquis and Red Bobs gave the heaviest yields. The wheat

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threshed from the Marquis weighed $\frac{1}{2}$ pound per bushel more than the Red Bobs. Banner oats proved their ability to withstand adverse conditions by outyielding the Victory by four bushels per acre. This is the first time that the Banner has given heavier yield than the Victory. All yields of barley were low and the quality of the grain poor. The two-rowed sorts have again given heavier crops than the six-rowed. The Duckbill, a two-rowed sort, and the O A C No. 21, a six-rowed, were two of the most promising varieties under test. The former has a very strong straw for two-rowed barley. Peas were a failure; while the growth of vines was vigorous for such a dry season, the blossoms were frozen in July and an early September frost destroyed the pods. Flax plots were destroyed by a windstorm in June. Spring rye outyielded the barley, withstanding the spring frosts and dry weather much better. Fall rye was again winter killed very badly. In order to determine the best time of the year to sow the fall rye and value of the grain stubble to hold the snow and thus protect the crop a series of experiments along this line has been commenced with the fall rye.

FORAGE CROPS.

While the yields of all classes of forage crops were low yet the drought had the important effect of demonstrating the superior powers of some forage plants to produce profitable yields on a meagre supply of moisture. Two outstanding crops in this respect are the Western rye grass and Sweet clover. In several parts of the experimental fields the rye grass and timothy were grown on adjacent plots. In every test the rye gave fair returns while with a few exceptions the timothy was not worth cutting. Sweet clover thrived well giving two cuttings; the highest yield per acre for the season being two ton 680 pounds of cured hay.

HORTICULTURE.

Fruits.—The new wood ripened rapidly on the fruit trees and fruit bushes in the autumn of 1917, consequently, there was little winter killing. Spring frosts caught the early blossoms on the currants decreasing the yield by at least 50 per cent. Strawberries and gooseberries gave fair returns as the fruit matured early in the season but the raspberries ripened later were more affected by the drought. As in previous years the importance of growing the hardiest varieties of bush fruits and strawberries has again been clearly demonstrated. The Dakota strawberries, Houghton gooseberries and Sunbeam raspberries are three outstanding varieties in this respect. In the currants there are several varieties that were nearly equal. Dr. Saunders' selections proved much heavier yielders than any other varieties.

Vegetables.—Shallow sown seeds failed to germinate until the soil was moistened by the late July rains. As a result of the drought much of the vegetable garden was a failure. The greater part of the work for the season was planned along the line of seed production; cabbage and celery were two of the main crops used and a considerable number of heads of each were saved for seed production work in 1919.

For the first time in the history of this Station potatoes were produced at a loss, being due not so much to the drought as to frosts in late July that froze the shaws and checked the growth of the tubers for approximately one month. The tubers had just started to grow again when the vines were frozen by frosts in early September.

Ornamental Gardening.—The growth of trees and shrubs was weak, due to the lack of moisture. Perennial flowers generally made a splendid showing considering the season. While the plants were not quite as large as usual the blooming was almost as free as that secured in more favourable years. Annual flower seeds sown in the flower beds failed to germinate but transplanted plants from the hotbeds thrived fairly well and helped the appearance of the flower border considerably.

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MEETINGS.

During the mid-summer months the following organizations held picnics and excursions to the Station: Local Grain Growers' Association and Farmers' Club, Broadacres Educational League, Grassy Lake Grain Growers' Association, Cut Knife Agricultural Society. The Acting Superintendent acted as judge at a number of the rural fairs, addressed several agricultural society meetings and assisted with the Short Course in Agriculture at the Agricultural College, Saskatoon.

EXHIBITIONS.

The exhibit sent out from the Scott Station supplemented the travelling exhibit from the Central Experimental Farm at the Saskatoon Fair. In addition, the following fairs were visited: Naseby, Unity, Wilkie, Cut Knife, North Battleford and Kelfield. The Acting Superintendent and one of the farm staff were in attendance at each of the fairs to answer questions relating to the experiments conducted on the Station.

VISITORS.

Approximately 3,000 persons visited the Station during the year.

FREE DISTRIBUTION OF SAMPLES.

A total of 225 samples of potatoes were distributed and in addition 71 parcels of trees and fruit bushes were sent out and 280 packets of flower and Caragana seed.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.**REPORT OF THE SUPERINTENDENT, W. H. FAIRFIELD, M.S.**

THE SEASON.

The season of 1918, on account of the very scanty rainfall, proved extremely disastrous in nearly all parts of Southern Alberta. The rainfall recorded at this Station from April 1 to July 31 amounted in all to only 2.31 inches, while the normal precipitation for these four growing months for the last seventeen years has been 8.27 inches. In regard to the amount of moisture carried in the soil from the year previous, which is always an important factor in considering any season's results, it might be said that the precipitation during September, October and November in 1917 was only 2.39 inches while the average for these months is 3.06 inches. Therefore, considering that the stored moisture carried over in the subsoil was extremely light, combined with the very small amount of rainfall that fell during the period of growth in the spring, the remarkable thing was, not that there was a crop failure, but rather that any grain at all was produced even upon well-prepared, summer-fallowed land. Of course, on land not summer-fallowed in 1917 no grain at all was produced.

The winter of 1917-18 was colder than usual. The snow that fell remained on the ground so that with the continued cold weather farmers were compelled to feed their live stock much more hay than is ordinarily necessary. Live stock generally were not in as good order as usual by spring, sheep as a class suffered most, the lamb crop being unusually light.

The first work on the land was done April 3; seeding was started on the 7th. The last frost in the spring occurred on the morning of June 3, when the minimum temperature recorded was 31.5. The first frost in the fall was on September 15, when the temperature dropped to 28.0°.

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On irrigated land the yields of grain were very satisfactory where the crops were irrigated at the proper season. Unfortunately there was a general shortage of irrigation water due to the fact that the Company's main canals had been allowed to "silt up" unduly during the three wet seasons that preceded 1918. Fortunately however, this shortage was not felt till most of the farmers had irrigated their hay crops, so that, generally speaking, the yields of hay were about normal. In fact alfalfa produced a particularly abundant crop, as the farmers gave special attention to the irrigation for the second cutting.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.	Sunshine.
	Maximum.	Minimum.	Mean.		
1918.				Inches.	Hours.
April.....	77.0	6.0	41.9	0.13	259.5
May.....	80.0	21.0	47.9	0.58	246.9
June..	89.5	29.0	61.6	0.755	356.8
July..	94.0	35.0	62.6	0.85	314.2
August..	93.0	33.5	62.5	1.23	311.7
September	83.0	32.0	54.5	1.07	215.6
October.....	78.0	11.0	46.16	0.24	169.0
November.....	59.0	1.5	32.77	0.43	129.0
December..	53.0	-11.0	29.2	0.46	79.0
1919.					
January.....	57.0	-5.0	34.27	0.06	105.1
February...	60.0	-16.0	14.3	0.95	94.1
March..	62.0	-35.0	16.4	0.75	151.7
				7.505	2,432.6

LIVE STOCK.

Horses.—At present there are twenty head of horses at the Station, which comprise draught horses, drivers and colts. The heavy draught horses include two imported Clydesdale mares and several grades. The horses are in good condition, practically all being wintered in an open corral. Breeding operations were very satisfactory during the year, the four foals making excellent progress.

Cattle—Feeding Tests.—Feeding tests were again carried on during the winter of 1917-18. Thirty-eight, two- and three-year-old steers were purchased in December, 1917. They were divided into two groups and fed in open corrals. Twenty of the largest and best steers were placed in group 1, the object being to finish them in as short a time as possible. They were fed 119 days and sold March 31, 1918, at \$12 per hundredweight, less 2½ per cent shrink. The net profit per head was \$20.12, and it cost 21 cents to produce one pound of gain. The remaining eighteen steers in group 2 were put on a longer feeding period lasting 162 days and were sold May 16 at \$15 per hundredweight, less 2½ per cent shrink. They realized a net profit per head of \$41.76, costing a little over 20 cents per pound gain. The following high prices were charged for food consumed: Alfalfa hay, \$17 per ton; green feed, \$17 per ton; meal (oats and barley), \$2.35 per hundredweight, and screenings (ground), \$2.10 per hundredweight.

A feeding test with twenty-two head of steers is under way during the winter of 1918-19, comparing alfalfa hay with cut roughage made up of two parts alfalfa hay and one part straw. The steers will be fed till early May.

Milch cows.—Three grade milch cows are kept to supply milk to the employees on the Station. A pure-bred Shorthorn heifer (milking strain) was obtained in exchange for some grade stock, during the year.

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Sheep.—At present the farm flock consists of grade Shropshire ewes bred up from a Merino base. The flock is made up of 41 ewes, 35 shearling ewes, 27 ewe lambs, and 1 Shropshire ram. In the spring of 1918 the lamb crop was very satisfactory, 39 ewes out of the 41, or 95 per cent, dropped 68 lambs, 62 of these or 91 per cent were raised, thus showing an increase from the 41 head of 151 per cent. At six months old, 24 of the wether lambs, averaging 85 pounds, were sold at 15 cents per pound, netting \$12.75 per head, which clearly demonstrates the value of marketing lambs early. The sheep were sheared in May, netting 785 pounds of wool, averaging a little over 10 pounds per head. During the year 7 pure-bred Lincolns (6 ewes and 1 ram), and 5 pure-bred Rambouillet ewes were purchased, preparatory to conducting breeding experiments.

Feeding Tests.—A winter feeding test with two deckloads of lambs was carried out in the season of 1917-18, along similar lines to those followed the past three or four years. One deck of lambs was sold at the end of March, showing a profit of \$1.69 per head. The second deck was sheared early in April and put on the market about the middle of May, realizing a profit of \$5.27 per head. The first deck was composed of home-grown and range lambs. The home-grown showed a profit of \$1.85 per head as compared to \$1.50 per head for range lambs. The second deck was divided into two lots, group 1 receiving mixed grain, and group 2 screenings. It was found that it took 105.9 pounds of screenings to equal 100 pounds of grain (equal parts of barley and oats) or screenings were 94.4 per cent as efficient as the grain. A feeding test with 220 head of range lambs is under way during the winter of 1918-19.

Swine.—Six pure-bred Berkshire sows, one grade sow and one pure-bred Berkshire boar constitute the foundation stock at the Station. Young pigs were fed during the past season, part with self-feeders and part hand-fed. The tests have not been conducted a sufficient length of time to draw conclusions therefrom, but it may be said that those which were hand-fed made better gains on less feed than those fed with self-feeders. An experiment in "hogging off peas" was conducted during the summer. Twenty-five pigs were turned in a field of 4.9 acres of field peas on August 1 when the peas were in the thick dough stage. The animals had access to water but no other feed. They were weighed off November 4, at which time the pigs had ceased to make rapid gains. It was found that 260 pounds of pork per acre was produced which at 15 cents per pound (the price at which the pork was sold) yielded \$35 per acre. There was still enough scattered peas on the ground to winter our brood sows. They came through the winter in excellent condition getting only what they picked up from the ground except during short periods of severe storms.

POULTRY.

The farm flock at the present time consists of 200 Barred Rocks and 35 White Wyandottes. In the spring of 1918 fair success was obtained in the hatching of chicks. During the summer they made excellent progress, the first pullet laying when she was 144 days old. During the winter all the pullets laid well, averaging 65 eggs each for the 4 winter months, six individuals laying 100 eggs or over during this period. One hundred and forty cockerels were sold during the winter for breeding purposes, and the demand this spring for both male birds and for hatching eggs is greater than can be supplied. Trap nesting of the pullets is being carefully carried out.

BEEES.

The results from the apiary for the season of 1918 were fairly satisfactory. Two out of the three colonies came through the winter, but one of these was weak and did not become productive until well on in the season. The two colonies produced 173 pounds of extracted honey, or an average of 86.5 pounds. The better one produced 144 pounds.

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FIELD HUSBANDRY.

The comparative tests with the various rotations continue to furnish valuable information and data on the cost of production of field crops as well as to show the best arrangement of the crops. The following is a list of the rotations under test:—

Rotations on Non-Irrigated Land.—Rotation "A" Wheat Continuously; Rotation "B" two years duration Wheat, Summer fallow. Rotation "C" three years duration Summer fallow, Wheat, Coarse grain. Rotation "M" six years duration Summer fallow, Wheat, Coarse grain, manured in fall, Summer fallow, Peas and Oats for Hay, Barley or Oats. Rotation "S" nine years duration, Summer fallow manured for hoed crops, hoed crops, Wheat, Summer fallow, Wheat, Coarse grains, Summer fallow, Peas and Oats for Hay seed to Fall Rye, Rye pasture. Rotation "T" ten years duration, Summer fallow, Wheat, Oats or Barley, Seed to Alfalfa, Alfalfa hay or seed for two years, Summer fallow, hoed crop, Wheat manured in fall.

Rotations on Irrigated Land.—Rotation "U" ten years' duration, seeding Alfalfa, Alfalfa for five years, hoed crop, Wheat, Oats, Barley. Rotation "V" Alfalfa continuously.

The following table shows the average cost, the returns and profit per acre for the past seven years, of the various rotations. These values are all figured on normal pre-war prices, so that the years are comparable. If the present return values were used the profit would be much greater:

Rotation.	Duration	Average cost per acre for 7 years.		Average returns per acre for 7 years.		Average profit per acre for 7 years.	
	Years.	\$	cts.	\$	cts.	\$	cts.
Non-Irrigated Land							
"A"	1	8	65	17	54	8	89
"B"	2	7	63	12	64	5	01
"C"	3	7	16	14	47	7	31
"M"	6	9	56	15	02	5	46
"S"	9	9	57	14	71	5	14
"T"	10	9	74	20	32	10	58
Irrigated Land							
"U"	10	17	56	62	93	45	37
"V"	1	9	24	72	79	43	55

CEREALS.

The yields of all cereals on the dry or non-irrigated land were light on account of the very dry season, in fact no crop at all was obtained except where sown on summer-fallowed land. Good results were obtained from the irrigated plots and compared favourably with past years.

On the dry land, Marquis and Red Fife each yielded 14 bushels per acre, although Huron stood at the head of the 16 varieties of spring wheat tested, yielding 15 bushels per acre. Of the seven varieties of oats, Gold Rain, Irish Victor and Victory proved the best with a yield of 35 bushels 10 pounds per acre. Eleven varieties of barley were tested, Gold giving the best yield, closely followed by Swedish Chevalier and Bark's. With field peas MacKay stood at the top of the seven varieties tested yielding 17½ bushels per acre. Long Stem Flax leads in the six varieties under test.

On the irrigated land, of the varieties of spring wheat tested, Marquis stands at the head in the average results for the past five years with an average yield of 65 bushels and 47 pounds. It yielded 61 bushels and 38 pounds this season. Of the six varieties of oats tested, Danish Island and Banner were the best, with yields of 107 bushels and 104 bushels and 19 pounds respectively. Eleven varieties of barley were tested, Bark's leading with a yield of 107 bushels and 24 pounds per acre, followed by

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Swedish Chevalier, which yielded 91 bushels and 20 pounds per acre. With field peas, Mackay heads the list with a yield of 66 bushels per acre. Long Stem flax, yielding 45 bushels per acre, leads in the six varieties of flax tested.

FORAGE CROPS.

Indian Corn.—Three varieties were grown this past season. The yields on the dry or non-irrigated land were very low, Yellow Flint leading with a yield of nearly 6 tons per acre. On the irrigated land, Yellow Dent again leads with a yield of over 16½ tons per acre. The results with corn were somewhat unusual in that several of the early varieties ripened seed.

Roots.—Of the seven varieties of turnips tested during the past season, White Globe leads on both dry and irrigated land, yielding a little over 6½ tons per acre on the dry land and 22 tons on the irrigated land.

In the mangel test, Giant Half Sugar White was the best variety, yielding nearly 17 tons per acre on the dry land and 48 tons per acre on the irrigated land. No results were obtained with carrots on the irrigated land, but on the dry land Imperial Short White yielded nearly 18 tons per acre. Six varieties of sugar-beets were tested, Wohanka proving the best on both dry and irrigated land.

Mangel Seed Production.—This is the first season's experience in handling and harvesting of mangel seed. Nine hundred pounds of seed were obtained from 1½ acres. Sixteen acres of stecklings were also harvested, and have kept through the winter in fine condition. About half of them were stored in a root cellar and the other half in pits in the field.

Grasses and Clover.—Alfalfa is the main hay crop on the irrigated lands in the Lethbridge district, averaging around 4 tons per acre. On the dry land this year there was practically a failure of grasses and alfalfa.

Pastures.—The pasture giving the best returns on the irrigated land this past season was a mixture of Western Rye grass 6 pounds, Kentucky Blue grass 6 pounds, Meadow Fescue 6 pounds, and alfalfa 4 pounds per acre. The results again go to show that the addition of alfalfa to the mixture more than doubles the carrying capacity.

HORTICULTURE.

Fruits.—The trees, with only one or two exceptions, of all varieties of apples except the crabs have now succumbed. Practically all varieties of Dr. Saunders' cross-bred crabs have withstood the recent severe winters. Late frosts, however, destroyed the fruit crop. The late frost also destroyed the blooms on the plums. For the first time the black currant bushes died badly. The crop of fruit on the red and white currants was light. A normal yield of fruit was obtained from the raspberries. The strawberry crop was only fair.

Vegetables.—A good crop of the hardy vegetables was harvested. The season, on account of the drouth, was warmer than usual, consequently the yield of ripe tomatoes was very much higher than usual. Practically the entire crop of the extra early sorts ripened fully before killing frosts occurred. The corn crop was particularly good.

Potatoes.—The crop on the dry land was light; on the irrigated land the yields were normal.

Ornamental Gardening.—Each season shows an encouraging growth in the trees and shrubs planted on the station. The native cottonwood continues to make an

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excellent showing, and it is without doubt a tree particularly suited for this district. The hardier ornamental shrubs did well, but the bloom was not as profuse as usual. The fine showing made by the hardy herbaceous perennials is only further evidence that these are worthy of a permanent place in all gardens in this part of the province. The usual assortment of annual flowers were grown, and displayed an attractive mass of colour during the latter part of the season.

DOMINION EXPERIMENTAL STATION, LACOMBE, ALTA.

REPORT OF THE ASSISTANT TO THE SUPERINTENDENT.

B. C. MILNE, B.S.A.

THE SEASON.

Work on the land commenced earlier in the spring of 1918 than in the previous year. Discing was started on April 9, while the first seeding commenced April 13. The land was in splendid shape and had a good supply of moisture. Seeding was finished during the first three weeks of May, with the exception of those areas upon which green feed was sown. The weather was dry and windy during the greater portion of May and many of the cereal crops of Central Alberta suffered from frost. While the early part of June was a repetition of May, a good rain fell during the last week, supplying moisture sufficient for the immediate needs of grain crops. In July a severe frost did much damage to crops over Central and Northern Alberta. Harvest commenced on August 10 at this Station, and was general during the latter part of the month throughout this district. Continued dry weather favoured all harvesting operations, and enabled farmers to do considerable fall ploughing, after finishing threshing.

The winter, with the exception of two weeks in February, was one of the mildest on record, and as a result great savings were effected in feed, while livestock wintered outside came through in splendid condition. The snow fall was light, not more than eight inches lying on the ground at any one time.

METEOROLOGICAL RECORDS.

Month.	Maximum.	Date.	Minimum.	Date.	Precipitation.	Sunshine.
1918.					Inches.	Hours.
April.....	69.3	20	3.9	2	0.46	236.3
May.....	78.8	3	18.9	19	0.94	195.8
June.....	85.3	22	26.4	2	1.47	259.7
July.....	92.6	19	32.9	4	1.24	296.9
August.....	89.8	1	32.7	28	3.93	242.3
September.....	83.4	12	25.4	14	1.125	212.9
October.....	75.8	5	10.9	23	0.015	157.2
November....	56.3	1	4.9	23	1.20	118.5
December.....	45.8	2	- 8.1	13	0.725	60.2
1919.						
January.....	48.8	9	- 6.0	2	0.21	74.2
February.....	47.0	10	-40.6	25	0.818	100.7
March.....	56.3	31	-30.3	4	0.77	156.1
					12.903	2,110.8

LIVESTOCK.

Horses.—There are now 26 head of horses at this Station, made up of registered Clydesdales, Percherons, Hackneys, and grades. All mature horses which were idle

during the winter were fed in the open on green feed and hay, at a cost of 26.2 cents per day. Young horses were fed in a similar manner but were put in the barn at night. All made a considerable gain in flesh.

Dairy Cattle.—This Station now has 29 head of pure-bred Holstein cattle, besides 21 grade Holsteins. The output has been made into cheddar cheese, which was sold locally at 25 cents per pound. The average lactation period, of all cows, which finished during the fiscal year, was 379 days, while the average record of production was 7,539.1 pounds of milk. Among this number were several heifers which were fresh for the first time. The average return per cow for the year, for her product made into cheese, has been \$188.25. The Holstein herd bull, “Prince Aaggie Mechthilde,” is leaving some very promising stock, which show great scale, feeding capacity, and constitution.

Beef Cattle.—There are now 39 head of pure-bred Aberdeen Angus cattle at this Station. Some excellent bulls sired by “Elm Park Wizard” and “Edward of Glen-carnock” have been raised during the year, and disposed of at profitable prices, while for our own herd we have two promising young bulls; one out of an imported cow, “Norma Gordon of Glen Logie,” and one from “Blackbird McHenry 83rd.” Besides this stock, 9 grade beef cattle are on hand on March 31.

Sheep.—The first year’s work with over 400 ewes used in a grading up test by mating to rams of Shropshire, Oxford, Leicester, Cheviot, Hampshire, and Corriedale breeding, has given some interesting results, but it is, of course, too early yet to draw any definite conclusions. 334 lambs averaged 62.5 pounds in weight in the fall of 1918, while the average weight of all grade ewes used in this experiment was 111.9 pounds. They came through the winter in splendid condition, having been quartered in high board fence corrals and fed a good quality of prairie hay. The cost to carry 450 ewes during the preceding season from November 1st to June 15th was \$3.50 per head, when a good quality of prairie hay was fed at \$10 per ton, and a small amount of grain at 2 cents per pound. The following table gives a financial summary of the results secured with our flock of sheep:—

October, 1917.			
Total cost of 450 ewes.		\$ 6,750	00
Total cost of 14 rams.		1,000	00
Total cost of 9,450 pounds grain.		189	00
Cost of 143 tons 300 pounds hay.		1,431	50
Cost of shearing.		86	18
Cost of pasture.		60	50
Returns.			
Sale of wool.		\$ 2,136	39
420 ewes value November 1, 1918.		6,720	00
334 lambs value November 1, 1918.		3,340	00
14 rams value November 1, 1918.		910	00
Profit.		\$ 3,579	21
		\$13,096	39
		\$13,096	39

Swine.—The cost of gains of Berkshire, Yorkshire, and Duroc-Jersey hogs is again available for report and this year favour the Berkshires. However, the results of three years’ work show the number of pounds of grain required to make one pound of pork on the different breeds as follows:—

Yorkshire.	4 09
Duroc-Jersey.	4 69
Berkshire.	4 71

The dressing percentage of the various breeds for the past two seasons show them to stand in the same order. Further work will be continued along this line before definite conclusions are drawn.

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The general pasture experiments with hogs failed to show the usual advantages of using pasture, no doubt due to the poor growth of forage crops as a result of the dry season. Oats and barley, of the cereals, again took premier place and are to be recommended for districts where this class of pasture is used. From results obtained, it can safely be said that rape is bound to continue as one of the standard pastures for hogs. Self-feeders have been used to good advantage, and are to be recommended, especially where hogs are fed in large numbers. Over six hundred hogs were used in securing data through the above experiments. This number does not include 66 breeding sows and 4 boars which are on hand at the end of the fiscal year.

Poultry.—The poultry at Lacombe now consists of 110 Barred Rocks, 176 White Wyandottes, 99 Rhode Island Reds, 4 Toulouse and 4 African geese, 8 Mammoth Bronze turkeys, and 4 Pekin ducks. Trapnesting has been continued and has proved of great value in selecting the best egg producers. Sixteen hundred and thirty-one dozen eggs were laid during the year at an average feed cost, taken on all mature birds, of 35.7 cents per dozen, while the average price received was 54.2 cents per dozen. The feed cost of raising chickens from hatching until November 1st was 35.66 cents each, while the cost per pound was 8.655 cents. Over 150 breeding cockerels were carried during the winter at a cost of 12.6 cents each per month for feed. A large number of these were sold at reasonable prices to farmers in Central Alberta.

BEES.

No losses of colonies occurred during the winter of 1917-18. The four colonies were increased to seven, and during the summer a yield of over 95 pounds extracted honey each was secured from three of the hives. From the seven hives a total yield of 339.5 pounds extracted honey was obtained. This honey, together with the increase in colonies, gives a return of over 300 per cent on the money invested, no account being taken of labour.

FIELD HUSBANDRY.

The work on the main farm rotation and on rotations "C," "O," and "K" was continued throughout the season. Owing to dry weather, the yields were not as high in some cases as usual. The highest return per acre was secured from oats and peas, seeded at the rate of 2 bushels of oats and 1 bushel of peas per acre, and used for ensilage and fodder. The fact that this ensilage reduces the cost of a pound of butter 20 per cent and is thoroughly suited to feeding beef cattle, is a further inducement for its more general cultivation. On various rotations the cost of producing a bushel of wheat varied from 33.43 cents to \$1.81 as a result of the different methods of cultivation and crop rotation.

Cultural Experiments.—The new method adopted of seeding the paths between the plots in all cultural experiments appears to make for more uniformity than formerly. The results of 1917 are further substantiated by the average of seven years, and may be expressed briefly as follows:—

1st. Single ploughing of land for summer fallow, gives better yields of grain on better standing straw than double ploughing, and it is advisable to do this in May or early in June.

2nd. Ploughing from 6 to 8 inches deep gave the maximum yield on stubble land, while on sod the greatest depth tried, namely 5 inches, gave the best returns.

3rd. Fall ploughing of land without burning off the stubble is to be recommended.

4th. Early breaking of sod land yields best, especially if well cultivated.

5th. The use of a nurse crop is recommended in seeding grass seeds and clovers in this district, especially if the land has been in roots or summer fallow the previous year.

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6th. The application of barnyard manure to roots and grain has again proved valuable, and most so when worked into the land shortly after applying. The seven year average shows an increased yield of four bushels and two pounds of wheat, or nine bushels and five pounds of oats, or ten bushels and thirty-four pounds of barley per acre, to result from the application of 12 tons of manure.

CEREALS.

Eighteen varieties of spring wheat were tested in duplicate plots. Red Bobs, a selection of Bobs, gave the highest yield in 1918, viz., 53 bushels and 20 pounds. Marquis continued to yield well and is to be recommended for districts not subject to early frost. Ruby, Ottawa 623, ripened thirteen days earlier than Marquis, and yielded scarcely two bushels per acre less than that variety. This wheat is certainly to be recommended for districts liable to early frosts. Several new selections of wheat yielded well, and will no doubt be of value in Central Alberta. Banner topped the list of the twelve varieties of oats tested, by yielding 130 bushels per acre. The new hullless oat, Liberty, Ottawa 480, yielded 81 bushels and 26 pounds per acre, and will no doubt be of value to poultrymen and others who have use for an oat that threshes free from hull. Barks barley again took premier place as a yielder with 111 bushels and 12 pounds per acre. Of the other six-rowed sorts, O.A.C. 21 and Manchurian also yielded well, while Gold and Duckbill, Ottawa 57, of the two-rowed varieties yielded over 100 bushels per acre.

FORAGE PLANTS.

Owing to the scarcity of labour and suitable seed, no experiments were conducted with corn or roots.

Grasses and Clovers.—Fifty-eight grass plots seeded in 1917 gave very good returns of hay this year. While it is too early to draw definite conclusions yet, we found the best yields of hay this year from plots seeded down to mixtures, consisting largely of alsike clover, timothy, and Western Rye grass. Brome grass also yielded well, but has the disadvantage of being hard to hold in check. While mixtures containing Kentucky Blue grass when cut for hay failed to compare well with other varieties, we look forward to more general use of this grass as a permanent pasture.

HORTICULTURE.

Fruits.—Although some apple blossoms suffered from spring frosts, and the trees did not all come through the severe winter unscathed, some fruit was obtained, making this the sixth successive fruiting season. Young trees of Antonovka, Don, Blush Colville, Charles, and Jewel, varieties of cross-bred apples, came through in good shape, and will be used for further planting out in the orchard. Seedlings of Manitoba plum wintered well and blossomed for the first time. Small fruits were again very successful despite the dry weather and splendid yields of strawberries and raspberries were obtained. Senator Dunlap and August Luther strawberries, and Sunbeam, Cuthbert, Herbert and Sarah raspberries were the leading varieties. Gooseberries yielded fairly well, the Houghton variety heading the list.

Vegetables.—Vegetables on the whole made a good showing. Both variety and cultural tests were carried out successfully. No special work was done with potatoes, other than propagation and variety tests. In controlling scab a solution of bichloride of mercury was found to be superior to formalin.

Trees, shrubs, and flowers.—A good showing of annual and perennial flowers was made in the border. Most of the trees and shrubs came through the winter in good shape, although Spirea Van Houttei had to be covered lightly with manure for

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protection. All varieties of Caranaga, Lonicera Tartarica, and Syringa Villosa, flowered very freely in their due season. Owing to the lack of rain the lawns were not as green as usual, but the hedges made a good showing and were much admired by visitors.

MEETINGS.

The superintendent addressed the meeting of the milk producers at Calgary, the live stock conference at Ottawa, the Alberta Holstein Breeders Association at Edmonton, and the Alberta Dairy Convention at Calgary, while he acted as judge of dairy cattle at Edmonton and Brandon, and swine at Calgary and Red Deer exhibitions.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

REPORT OF THE SUPERINTENDENT, R. H. HELMER.

THE SEASON.

The past year has been the driest in the recorded history of this district. There was a water shortage in the hills, dams did not fill as well as they should have done, and during July matters were quite serious in some districts. The situation to a great extent was saved by the rains in August. Dry farmers from Kamloops to the boundary were saved by this rain. In some cases, wheat and oats had not germinated at all and when the rain came a crop grew and was harvested for hay. At the Provincial Seed Fair, in previous years, the Rose Hill district near Kamloops always carried away the prizes for wheat and oats; this year there were very few exhibits from this district. July was the hottest month, the mean temperatures being maximum 79.19, minimum 58.19; the hottest day of the year was July 17 when the temperature reached 100 degrees in the shade. The lowest temperature reached during the winter 1918-19 was 3 degrees above on February 24. Very little snow fell during the early part of the winter; there was a good fall during late February and early March.

METEOROLOGICAL RECORDS.

Month.	Temperatures.			Rain.	Snow.	Sunshine.
	Maximum.	Minimum.	Mean.			
1918.	°	°	°	Inches.	Inches.	Hours.
April.....	81.00	25.00	48.48	0.08		250.1
May.....	79.00	31.00	54.22	0.28		204.9
June.....	94.00	37.00	65.16	0.19		291.2
July.....	100.00	48.00	68.69	1.16		234.2
August.....	88.00	44.00	64.73	1.62		236.6
September.....	83.00	43.00	63.34	0.22		270.3
October.....	68.00	34.00	51.01	0.94		111.2
November.....	58.00	19.00	38.44	0.90	1.10	63.4
December.....	48.00	16.00	31.64	0.16	4.40	46.9
1919.						
January.....	47.00	11.00	31.01	0.29	5.30	58.1
February.....	43.00	3.00	28.30	0.08	10.80	73.4
March.....	61.00	8.00	35.70	0.06	8.10	141.3
Totals.....				5.98	29.70	1,981.6

LIVE STOCK.

Horses.—There are seven horses on this Station, three work teams and one driver. All are in good condition.

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Cattle.—The total number of cattle (beef) is 53. During the winter we carried out feeding experiments on 40 steers and 14 cows. Generally these made very good gains, but owing to the high price of feed, the margin of profit was only small.

Sheep.—We have a flock of 35 sheep, pure-bred Cheviots and grade Oxford-Shropshires. These have only done fairly well; our range is very limited and the ewes have not been able to get sufficient exercise. Goitre has been very bad in the lambs and we lost no less than eight from this trouble. In an endeavour to overcome this we have this year fed potassium iodide, 2 grains per ewe per day for four weeks before lambing.

Swine.—We have 25 head of swine. Six of these are brood sows; the three younger ones were sent to Kelowna to be bred to a championship boar. During the summer the pigs were pastured on alfalfa in one of the orchards and fed grain from a self-feeder, others were tried with no grain but subsequently some grain had to be fed to keep the young stock growing. During the winter they have been housed in portable houses and the sows will farrow in these cabins. They are comfortable and all pigs have done well.

POULTRY.

The laying stock consists of 108 White Wyandottes, 48 hens and 60 pullets, with 10 adult males; 9 Bronze turkeys, 4 Pekin ducks and 4 Indian Runner ducks. Two incubators were run during the season with a total of 1,221 eggs, 779 of which were fertile, out of which we got 406 chicks. The 50 pullets which were bought in the winter of 1917-18 laid, during the year ending December 31st, an average of 151.74 eggs each. This year all the pullets will be trap-nested in an endeavour to build up a strain of heavy layers.

BEEES.

Of the five colonies put away in the fall of 1917 four came out in good condition, one having died during the winter. These did well, the average weight of honey produced per colony being 96½ pounds, value \$16.68. They were prevented from swarming, one nucleus being taken which built up to a strong colony ready to go into the winter.

FIELD HUSBANDRY.

The hay crops were greatly reduced by the seed production work. In connection with alfalfa records are now available of amounts of water in relation to yields and indicate a greatly increased tonnage with increased amounts of water. Again, it has been found that alfalfa sown without a nurse crop pays in this district. Two fields of alfalfa were sown on the same day, one with a nurse crop of one bushel of oats per acre and one without nurse crop. When the oats were cut we found a very patchy stand of alfalfa which will have to be re-seeded this year. On the other field as soon as the alfalfa and weeds were nine inches high the mower was put over it and the tops were allowed to lie. In September a good crop of alfalfa was cut from this field. On the sandy land nearer the lake the stand of alfalfa has improved but is not very good yet. With scarcity of water, this area does not get its share as it is felt that the available water can be used to better advantage on lands that will produce better crops.

CEREALS.

In the cereal plot six varieties of wheat were tested, four of barley and four of oats, in quadruplicate plots, the highest yields being given by Huron wheat, 32 bushels 20 pounds per acre, Manchurian barley, 41 bushels 32 pounds per acre, and Victory

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oats, 62 bushels 12 pounds per acre. We also had plots of flax and peas but owing to the shortage of irrigation water these were practically a failure, and the peas were also very badly affected with mildew and weevil.

Owing to the very dry weather, the plots on the dry farm were a complete failure. The seed germinated well and made good growth early in the season but by the time the rains came the plots were completely dried out.

FORAGE PLANTS.

The most important work in this branch was the emergency carrot and mangel seed growing. Carrot seed was grown on six acres (three acres of which was very poor soil) with an average yield of 666 pounds of finished seed per acre, and four acres of mangel seed, yielding 1,844 pounds of finished seed per acre. About twenty acres of stecklings were grown. Mangels came up well and were harvested the middle of October; carrots had to be sown three times, as the seed would not germinate well and many of the stecklings were too small to be of any use. The changeable weather during the winter was very hard on pitted roots.

In forage crop work we are now on a four-year rotation, two acres being devoted to each year. On the land on which we grew the mangels a "length of run of irrigation water" test on Yellow and Red mangels was conducted. Every twenty feet of mangels from the flume was harvested separately and weighed and the result showed a wonderful uniformity of irrigation. The difference between these varieties of mangels was not nearly so great as is usually found.

In the test plots of forage grasses, all did well with the exception of Kentucky Blue grass, which, although seeded twice, failed to grow.

HORTICULTURE.

Fruits.—The apple trees continue to make good growth and there is beginning to be a marked difference in some of the orchards under the various treatments. This year, the trees in the soiling crop orchard have made the most vigorous growth, outstripping those in the orchard under clean cultivation, although these are a good second. The orchard under a farm rotation shows a marked improvement, and this soil which was the poorest of any of the orchards is rapidly improving under this method of treatment. Again, the alfalfa orchard has made the least progress and there would appear to be no doubt that alfalfa in an orchard is detrimental to the growth of young trees. Pear trees have done better this year; cherries, plums, peaches and apricots have all made good growth and on the two latter fruit is expected this next season.

Vegetables.—A great many of the variety tests of vegetables this year had to be omitted to make room for plots for seed production. For this purpose, plots of the following vegetables were grown:—

Beets, cabbage, carrot, celery, cucumber, egg plant, lettuce, musk melon, water melons, onions, peppers, radish, spinach, squash, tomatoes and peas. The egg plants produced no seed, musk melons were very mixed, water melon seed did not mature, spinach was very poor, radish was scattered by a very high wind and the yield gathered was low, peas were almost a total failure owing to mildew.

Ornamental Gardening.—We had an excellent display of flowers. The bulbs were good, also the annuals, and the perennial border for a long time during the summer was a blaze of colour.

FERTILIZER EXPERIMENTS.

The three-year experiment with commercial fertilizer alone and in combination with barnyard manure, which was started in 1917, was continued this year with oats

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seeded to clover. Owing to the length of run of water no results were obtained and the clover came up very patchy. It has been found advisable to have a separate flume for each range of plots with a measuring box for each set of flumes and these will be installed this spring. One feature was very evident, that too much manure can be put on the land when water is scarce. On three plots with barnyard manure at the rate of 10, 15 and 20 tons per acre, the returns were in favour of the least amount in each case. The fertilizer work will be abandoned on this land till 1920. In the meantime some fertilizer work will be carried on with seed plants such as mangel and carrot.

BUILDINGS AND IMPROVEMENTS.

New flumes have been built in several places where these were required, also several lengths of portable fluming. Four colony houses for chickens have been built and two shells of poultry houses which are being temporarily used as houses for two of our teamsters. Eight hog cabins have been built and a permanent root cellar. This latter will be used principally for storing stockings of mangels and carrots for seed production and it has been fitted up with bins for this purpose. The size is 24 x 48 feet. Our new office building and the poultry administration building, which were finished in the spring of 1918, have been painted. The roads on the Station have been improved in many places by grading and shaling.

EXHIBITIONS AND MEETINGS ATTENDED.

This Station had an exhibit at the following fairs: Kelowna, Armstrong, Naramata, Summerland and the Provincial Seed Fair held at Kelowna in January. At all of these fairs seeds and seed production were made the special features and the exhibit put up aroused a good deal of interest. The Superintendent attended the irrigation Convention held at Nelson; Farmers' Institute meetings at Summerland, Naramata, Peachland, Kelowna and Keremeos and meetings connected with the British Columbia Seed Growers' Association at Kelowna, Armstrong, Penticton and Grand Forks.

VISITORS.

There has again been an increased number of visitors to the Station this year. The Kelowna Farmers' Institute paid their annual visit and numerous parties have been shown over the Station.

EXPERIMENTAL STATION, INVERMERE, B.C.

REPORT OF THE SUPERINTENDENT, G. E. PARHAM.

THE SEASON.

Weather conditions at the commencement of the fiscal year 1918-1919 were exceptionally favourable for spring work.

There was an abundance of moisture in the soil, due to the gradual melting of the winter's snows, which had fallen to the depth of 39.6 inches. With little or no frost in the ground, this moisture was readily absorbed, and the establishment of an ideal seed-bed was rendered possible.

The sowing of the varietal and cultural test plots in the horticultural division was completed by April 20th, and a number of plots were laid out and sown for vegetable seed production.

Seeding of all grain and rotation crops was commenced about the same date and was completed during the first week of May. Dry weather supervened, the total

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precipitation for the three spring months amounting to only 1.63 inches; bright sunshine, averaging nearly 9 hours a day, was recorded during the same period, with the maximum temperature reading of 90° , on June 12th.

On the dry-farming section, crops which, during the early part of the season, had kept pace with those on the irrigated plots, began to fall behind, and, the drought continuing, were practically burnt up. The wheat was a failure, no grain maturing. Swiss chard, however, made persistent growth throughout the season, though the final yield was not considerable.

On the irrigated sections some exceptionally heavy crops were grown, particularly of clover, alfalfa, peas and potatoes, and of alfalfa and clover sown with various grass mixtures.

Similar comparisons were reported by farmers in the district, the yields from irrigated crops being exceptionally high, while those from areas dependent on natural precipitation were practically negligible.

Haying was completed under ideal conditions, and early in August the drought at length lifted, and the crops were greatly benefited by the generous rains which followed.

The improvement was very noticeable on the benches and range pastures, which took on a new lease of life and made a considerable second growth, materially bettering the prospects for horses to be later wintered in the open.

Weather conditions during the fall were favourable for the harvesting of the grain, potato forage and root crops.

Open weather continuing throughout November, it was possible to complete fall-ploughing during that month.

Except for a slight fall on the 25th November, there was no snow prior to December 3rd, when 10 inches were recorded, and an usually mild winter set in.

The mean temperature for the three months—December, January and February—was 18.9° , as compared with 13.9° , the average for the four preceding years.

Though there were several falls of snow during the winter, Chinook winds, invariably accompanied by a rise in temperature, swept the lower levels of the valley, including the Experimental Station, practically bare of snow, on three occasions: the bench lands, however, and the less exposed areas retained a substantial covering until the last week of March.

Sleighbg commenced on the 4th December, and continued until the 15th March.

METEOROLOGICAL OBSERVATIONS.

The following tables summarise the temperature, rainfall, snowfall and sunshine readings for the twelve months under review, together with those of the four preceding years:—

TABLE SHOWING MEAN TEMPERATURES.
DOMINION EXPERIMENTAL STATION, INVERMERE, B.C.

Month.	1914			1915.			1916.			1917.			1918.		
	Mean max.	Mean min.	True mean.	Mean max.	Mean min.	True mean.	Mean max.	Mean min.	True mean.	Mean max.	Mean min.	True mean.	Mean max.	Mean min.	True mean.
April.	55.46	32.23	43.84	61.83	32.20	47.01	55.10	29.50	42.30	49.06	26.80	37.93	56.53	27.17	41.85
May.	65.83	38.13	51.98	63.31	40.83	52.07	57.90	35.20	46.55	63.50	37.00	50.25	60.87	34.65	47.76
June.	68.33	45.50	56.91	68.43	44.00	56.21	68.60	43.30	55.95	66.60	41.00	53.80	74.03	43.13	58.58
July.	81.29	47.67	64.48	71.83	48.77	60.30	81.29	47.67	64.48	81.50	47.40	64.40	77.81	47.93	62.87
August.	78.32	43.12	60.72	81.90	48.25	65.07	75.00	43.90	59.45	76.40	44.30	60.30	71.16	45.61	58.38
September.	61.86	37.70	49.78	62.62	36.40	49.51	63.76	35.56	49.66	65.03	38.23	51.63	71.40	39.16	55.28
October.	49.87	33.67	41.77	53.83	34.00	43.91	50.50	27.90	39.20	53.20	27.80	40.50	52.20	34.20	43.20
November.	37.50	23.86	30.68	32.06	16.66	24.33	31.70	12.40	22.05	36.70	27.30	32.05	36.40	21.27	28.83
December	19.74	3.67	11.70	29.58	12.67	21.12	14.00	3.90	5.05	23.50	7.50	15.50	27.26	12.87	20.06
January	22.45	3.80	13.12	4.83	14.41	4.79	21.80	2.90	12.35	22.80	6.70	14.70	28.29	11.23	19.76
February	36.00	15.46	25.73	28.40	6.60	17.56	25.60	3.00	14.30	23.90	3.14	13.52	26.82	7.14	17.00
March.	42.67	23.58	33.12	42.90	22.90	32.90	35.70	9.10	22.40	42.00	19.00	30.50	40.10	16.13	28.11
Means 12 months	51.61	29.03	40.32	50.12	27.40	39.16	48.41	23.88	36.14	50.35	27.17	38.76	51.91	28.37	40.14

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TABLES SHOWING EXTREMES OF TEMPERATURE.

DOMINION EXPERIMENTAL STATION, INVERMERE, B.C.

Month	1914.				1915.				1916.				1917.				1918.			
	Max.		Min.		Max.		Min.		Max.		Min.		Max.		Min.		Max.		Min.	
	Date.	Far.	Date.	Far.	Date.	Far.	Date.	Far.	Date.	Far.	Date.	Far.	Date.	Far.	Date.	Far.	Date.	Far.	Date.	Far.
April...	30	71	1	22	16	75	21	24	26	76	23	21	14	54	1	11	20	72	2	13
May.....	16	87	6	28	7	78	29	30	4	71	14	26	12	77	1	22	3	76	26	24
June.....	18	85	6	34	24	82	8	35	18	88	7	34	16	86	13	35	12	90	3	28
July	31	95	16	42	20	83	5	40	31	88	23	39	17	94	31	36	17	94	4	34
August	1	95	31	33	6	89	5	44	27	84	4	37	16	88	31	37	1	89	28	33
September	2	80	30	33	5	80	20	27	1	77	28	24	21	80	31	27	18	80	3	33
October	16	66	22	24	23	65	7	23	16	67	4	20	3	73	28	9	5	62	30	22
November.	25	51	15	3	1	49	13	04	1	47	12	12	4	50	1	16	14	48	25	2
December....	2	35	15	-16	4	40	30	16	2	39	27	31	18	44	15	15	7	42	31	-12
1915.																				
January	11	36	21	-15	23	10	12	34	9	40	31	25	3	40	31	-22	19	43	1	-10
February.....	17	44	14	-01	15	18	3	25	12	44	1	26	7	46	1	-27	11	42	24	-19
March	21	63	8	12	11	18	5	1	5	42	1	08	29	62	6	-05	29	61	1	-17

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SUNSHINE RECORDS.

MONTHLY TOTALS AND RATIO TO POSSIBLE HOURS, DOMINION EXPERIMENTAL STATION, INVERMERE.

Month.	Possible.	1914.		1915.		1916.		1917.		1918.	
		Total.	Ratio.	Total.	Ratio.	Total.	Ratio.	Total.	Ratio.	Total.	Ratio.
April.	414.2	hrs. 165.1	0.40	hrs. 208.7	0.47	hrs. 182.5	0.44	hrs. 168.9	0.40	hrs. 261.9	0.63
May...	449.8	237.1	0.47	168.0	0.32	179.1	0.37	227.0	0.47	241.0	0.50
June....	494.1	198.4	0.40	197.7	0.40	202.0	0.40	230.2	0.46	302.1	0.61
July....	497.9	314.5	0.63	211.4	0.42	271.1	0.51	365.1	0.73	304.0	0.59
August	450.7	267.9	0.59	269.9	0.65	209.0	0.60	300.4	0.66	214.0	0.47
September.	379.0	148.3	0.39	151.8	0.40	192.2	0.51	142.9	0.38	232.4	0.61
October	329.6	86.7	0.26	124.7	0.37	159.2	0.48	147.2	0.44	125.0	0.38
November..	266.1	56.4	0.21	59.0	0.22	84.6	0.31	23.7	0.09	89.9	0.34
December..	242.3	86.8	0.36	43.4	0.17	84.4	0.34	35.2	0.15	28.4	0.13
		1915.		1916.		1917.		1918.		1919.	
January	279.2	46.0	0.18	99.0	0.38	80.1	0.30	44.1	0.17	59.6	0.23
February ..	276.6	70.9	0.25	97.8	0.31	99.8	0.36	80.9	0.29	79.2	0.28
March.	306.6	175.8	0.47	131.7	0.45	143.7	0.40	141.7	0.39	167.5	0.46
Totals ..	4,457.1	11,853.9	0.42	1,763.1	0.40	1,947.7	0.44	1,910.3	0.43	2,105.0	0.47
Total daily average		5.1 hrs.		4.8 hrs.		5.3 hrs.		5.2 hrs.		5.8 hrs.	

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LIVE STOCK.

Hogs.—A Berkshire boar is kept at the Station for use by local breeders, and a start at hog raising is now being made by the introduction of a young Berkshire sow obtained from the Experimental Station at Lethbridge.

Cattle.—The herd consists of a registered Shorthorn bull and three Shorthorn cows.

Poultry.—A successful season was experienced in this Division: 200 birds were carried through the winter of 1917-18, and consisted of Barred Plymouth Rocks and White Leghorns. In order to save labour, only one pen, containing 50 Barred Rock pullets, was trap-nested; during the poultry year terminating October 31, 1918, this pen laid 6,876 eggs—an average of 137.5 per bird. The best bird commenced laying December 4, and by October 31 had 205 eggs to her credit.

A record was kept of the amount and value of all feed used in this pen, also of the cost and weight of food required to produce a dozen eggs; it was found that each bird consumed during the 12 months 84½ pounds of food at a cost of \$2.95.

The weight of food required to produce a dozen eggs averaged 7½ pounds throughout the year, and its cost averaged 25.8 cents.

Owing to the restriction placed upon the use of wheat as a poultry food, whole oats was substituted, during the early spring, as a grain ration; the sudden change of diet caused some digestive troubles among the young chickens, and there was some increase in mortality, but no deleterious effects were observed among the mature birds, in fact, during a 31 days' test ending April 17, 47 Barred Rock pullets, fed on whole oats only, as a grain ration, laid a total of 1,187 eggs—an average of 25¼ eggs per bird.

Cost of Raising Chickens.—An experiment to determine the cost of rearing chickens from date of hatching to the age of 10 weeks and 20 weeks was conducted with 50 Barred Rock pullets hatched in April. At 10 weeks old each bird had consumed 5½ pounds of food, at a cost of 16.4 cents, while at 20 weeks old 19½ pounds of food had been consumed, costing 54.5 cents.

Incubation.—The hatching records for the season were satisfactory; out of a total of 762 eggs set, 600 proved fertile; 59 eggs with dead germs were discarded and of 541 left in, 402 hatched, being 52.7 per cent of the total number set, or 67 per cent of the total of fertile eggs; 23 cripples were killed, and of the 379 chicks transferred to the brooder, 367 were alive July 1.

It was calculated that, for one chick hatched, 1.9 eggs were required, or 1.5 fertile eggs, while 2.1 eggs were needed to produce one chick alive July 1.

Current Poultry Year.—A more extensive programme for the current poultry season has been inaugurated, including records of the cost of production, the fertility, hatchability and livability of eggs and chicks hatched out in the different months.

A record is also being kept of the weight and value of feed used in all pens, the value, at local market prices, of eggs laid, and the profit or loss per pen, over cost of feed; pedigree records will be kept of any birds showing exceptional qualities. A small pen of White Wyandottes was raised from eggs procured from the Experimental Station at Sidney, Vancouver Island: these birds proved exceptional winter layers.

Turkeys.—The flock at the end of the season consisted of 34 birds of the American Bronze variety; of these, the male birds not required for breeding purposes were fattened and killed for the Christmas market.

The breeding birds came through the winter in fine condition with no other shelter than the natural fir trees. Good results were obtained through the use of an incubator for hatching.

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BEES.

Of the 14 colonies placed in winter quarters the previous fall, 10 came through in good shape. Experiments in wintering had been continued as in previous years, 8 being placed in the cellar, 2 in the open, protected by double packing cases, lined with moss and shavings, and 4 in a trench dug into a dry sandy knoll, the hives covered with 6 inches of straw and 9 inches of earth.

Of the 4 colonies that succumbed, two were in the cellar, and one each in the trench and in the packing cases; plenty of stores were found in the hives, and it is believed that the losses were attributable to damp.

The total yield of extracted honey produced by the ten colonies was 1,189 pounds, averaging 118.9 pounds per colony, the greatest yield from one hive being 192 pounds.

The honey was sold locally at 30 cents per pound, and the average value of product, that is honey, less cost of sugar fed, was \$29.09 per colony, spring count.

One hive was placed upon scales and a daily record of its gain or loss in weight was kept throughout the season, together with daily particulars of temperature, rainfall and other meteorological conditions.

There was no increase in the number of colonies during the year, and no losses through swarming, the trend of the experiments being in the direction of obtaining the maximum honey yield rather than of dividing or adding to the number of colonies.

FIELD HUSBANDRY.

Rotations.—Experiments were continued with rotations of 3, 4 and 5 years' duration in the irrigated sections and with a 6 year rotation under dry-farming methods. The latter, though making a good start early in the season, thanks to an abundance of moisture in the soil from the melting of the winter's snows, failed later from the effects of the drought which continued throughout the growing season and until early in August.

The plots of wheat and barley were burned up before the grain had formed in the ear but Swiss chard, sown as a hoed crop, again showed distinct drought-resisting qualities, and its value as a forage plant for the dry farm.

Under the 4-year rotation, consisting of hoed crop, wheat, peas, oats, a heavy yield of peas was obtained from the variety Prussian Blue, this plot threshing out at the rate of 29 bushels 22 pounds to the acre. The repeated successes obtained at this Station with field peas, and the entire absence, so far, of weevil or disease would seem to demonstrate the suitability of this district for that plant.

Under the same rotation, half an acre of mangels yielded at the rate of 17½ tons per acre; the plot received two dressings of poisoned bran, and the ravages of the cut-worm, which had practically destroyed the mangel crop in 1916 and 1917, were successfully checked.

In the 5-year rotation, a plot consisting of four varieties of swede turnip produced 27½ tons per acre.

In the 3-year rotation consisting of oats seeded down to clover-clover-potatoes, the latter yielded at the rate of 17½ tons per acre, of which 93 per cent were marketable; two heavy cuts were taken from the adjoining plot of clover.

Though it is early, as yet, to draw any definite conclusions as to the relative merits of these rotations, the experiments indicate the importance of growing clover in the year preceding a potato crop, and the advantage of ploughing under a pea crop as a means of adding humus to the soil.

ALFALFA.

The advantage of sowing alfalfa as a permanent crop on new land in this district has been clearly demonstrated during the last three years at the Station.

It has so far never suffered from winter-killing, although Red clover, under the same conditions, has been repeatedly killed out where the plant has lost the protection of the snow blanket, through "Chinook" winds and other causes.

An Alfalfa Crop Competition conducted under the auspices of the Windermere District Agricultural Association, and judged by the Superintendent, brought to light some very fine stands of alfalfa, and it would appear that the district is eminently suited to this plant; two cuttings in the year may always be reckoned upon; and occasionally three.

With a view to testing the comparative effect of winter conditions on alfalfa as the result of late cropping or of pasturing late in the fall, a third crop was taken from a part of a three-acre field at the Station: this will be compared as to vitality and yield with the rest of the plot, which was left standing with a considerable third growth, as protection for the winter.

IRRIGATION WATER RECORD.

A record has been kept for the past five years of the amount of water used for irrigation, together with the number of acre-inches on certain crops; the area selected comprised the 4-year rotation, half an acre of each of roots, wheat, peas and oats.

The following table records the figures for the past five years, and compares the amount of water needed for irrigation on the different crops during the four growing months—April, May, June and July—with the natural rainfall during the same period.

With an average precipitation for the four months of 6.38 inches, roots averaged an annual supply of 8.09 acre-inches of water, wheat averaged 6.35 acre-inches, peas 8 acre-inches and oats 5.63 acre-inches, while the whole field received an average supply of 7.03 acre-inches annually.

Irrigation Chart—4-year Rotation.

	Total precipi- tation for year.	Total precipi- tation 4 months. April-July.	Acre-inches used on roots.	Acre-inches used on wheat.	Acre-inches used on peas.	Acre-inches used on oats.	Total for year.
1914.	12.91	5.87	12.78	9.27	11.40	5.89	9.83
1915.	14.47	9.86	2.03	5.04	5.84	6.73	4.91
1916.	14.28	7.84	1.62	Nil.	3.52	Nil.	1.31
1917.	11.70	5.33	5.75	7.55	9.69	4.14	6.78
1918.	13.79	3.00	18.30	9.91	9.57	11.38	12.29
Average amount of water used per acre, in acre-inches. . .			8.09	6.35	8.00	5.63	7.02

FORAGE CROPS.

Clover and Alfalfa with Grass Mixtures.—An experiment was inaugurated in 1917 to compare the results of various mixtures of grasses sown with Red clover, with similar mixtures of grasses sown with alfalfa for hay. The 14 plots were seeded June 15, 1917 without a nurse-crop, and a good stand was obtained throughout the whole area. No crop was taken the first year, but the mower was run over the plots once, leaving a few inches of growth to carry the plant over the winter.

In the season now under review the plots were irrigated May 18 and 19, June 22-24, July 9-10, and again on September 12-13, after the second crop had been carried. The first cutting was taken on July 5; a second cutting of the clover and clover mix-

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tures on September 5, and of alfalfa and alfalfa mixtures a few days earlier. The total yields from the different plots are given in the following table:—

SECTION E. Alfalfa and Grass Mixtures.				SECTION F. Red Clover and Grass Mixtures.			
Plot No.	Mixture.	Wt. seed sown per acre.	Total yield hay per acre. (2 cuts).	Plot No.	Mixture.	Wt. seed sown per acre.	Total yield hay per acre. (2 cuts).
		Lbs.	Tons.			Lbs.	Tons.
1	Alfalfa.....	10	4.6	1	Red Clover.....	10	5.13
	Timothy.....	8			Timothy.....	8	
2	Alfalfa.....	10		2	Red Clover.....	10	
	Western Rye.....	10	4.62		Western Rye.....	10	6.88
3	Alfalfa.....	10		3	Red Clover.....	10	
	Meadow Fescue.....	15	5.00		Meadow Fescue.....	15	6.9
4	Alfalfa.....	10		4	Red Clover.....	10	
	Orchard Grass.....	15	4.65		Orchard Grass.....	15	6.12
5	Alfalfa.....	10		5	Red Clover.....	10	
	Tall Oat Grass.....	15	2.6		Tall Oat Grass.....	15	5.91
6	Alfalfa.....	10		6	Red Clover.....	10	
	Timothy.....	2			Timothy.....	2	
	Western Rye.....	3			Western Rye.....	3	
	Meadow Fescue.....	3 $\frac{1}{2}$			Meadow Fescue.....	3 $\frac{1}{2}$	
	Orchard Grass.....	3 $\frac{1}{2}$			Orchard Grass.....	3 $\frac{1}{2}$	
	Tall Oat Grass.....	3 $\frac{1}{2}$	5.16		Tall Oat Grass.....	3 $\frac{1}{2}$	6.63
7	Alfalfa alone.....	12	4.41	7	Red Clover alone...	12	5.94

The above plots measure 1-30th acre and as yet no manure has been applied. This test is being continued with a view to ascertaining the advisability of adding grasses when seeding down land with clover or alfalfa for permanent or temporary pasture.

Soiling Crops.—Experiments were continued to determine the most suitable crops for soiling purposes; plots of rape, Thousand-headed kale, and Swiss chard yielded heavily, as in the previous season, and in the order named. One cutting only was taken, being fed green to the cattle; Swiss chard proved at first the least palatable, until the taste for it had been acquired.

ROOTS.

Swede Turnips.—Half an acre of swedes were sown, the test being limited to four varieties, which yielded at the following rates per acre:—

Good Luck, 21.72 tons, Magnum Bonum, 27.31 tons; Invicta, 30.6 tons; Cornings Lapland, 31.48 tons.

Mangels.—The ravages of the cutworm being successfully controlled by the application of two dressings of poisoned bran, some satisfactory yields were obtained. The total from the half-acre plot was at the rate of 17 tons 464 pounds per acre, the best result was from Yellow Intermediate, yielding 20.37 tons per acre, followed by Half Sugar White, with 17.42 tons and Mammoth Long Red with 14.25 tons per acre.

This crop was sown in the 4-year rotation: roots, peas, oats, roots.

Sugar Beet.—Four varieties of sugar beet were grown, giving yields per acre as follows:—

Vilmorin Improved, 13.8 tons; Canada Grown, 15.8 tons; Russian Grown, 19.8 tons; Wanzleben, 17 tons.

Carrots.—Three varieties of carrots were tested on land which had received no manure or fertilizers; it had, however been dressed heavily with farm manure for the previous crop of field corn. The highest producer was White Belgian which yielded at the rate of 29.15 tons per acre, the next in order being Improved Short White with 26.3 tons, followed by Danish Champion (a red variety), with a yield of 19.7 tons.

CORN.

The test of field corn was limited to two varieties, which were sown May 13. A night frost on June 1st, when a temperature of 28 degrees was recorded, thinned out the plants, but not sufficiently to render re-sowing necessary.

There was considerable growth, and the plant yielded well as fodder, showing one or two cobs on 75 per cent of the stalks, but the season was not sufficiently long to ripen the cobs.

CEREALS.

Variety tests were continued with wheat, barley, oats, and peas, on a five-year rotation, the aim of which is to supply humus to the soil by alternating crops of legumes with cereals.

The system of the rotation is as follows: First year—peas, ploughed under for humus; second year—cereal, seeded down with clover; third year—clover (second crop ploughed under when ready for cutting); fourth year—peas, for seed; fifth year—cereal.

Duplicate one-fortieth-acre plots are sown, totalling one-twentieth acre to each variety. Samples of all grains are forwarded to Ottawa for further tests of germination and milling qualities. The Dominion Cerealists has on many occasions remarked on the good yields and the high quality of grain, and has expressed the opinion that the soil and the climatic conditions in this district are particularly favourable for the growing of peas.

The following table gives the yields per acre obtained from the different varieties during the past four seasons:—

CEREAL VARIETY TEST—YIELDS PER ACRE.

Name of Variety.	1915.	1916.	1917.	1918.
	Bush. Lb.	Bush. Lb.	Bush. Lb.	Bush. Lb.
Wheat				
Huron.....	22 22	28 00	27 40	12 30
Marquis.....	23 40	31 40	24 20	24 40
Proctor.....	22 40	22 20	23 20	24 40
Barley				
Marquand.....	25 00	42 44	18 00	16 20
Summit.....	16 42	15 20	15 40	11 20
Chevalier.....	10 00	60 00	21 25	23 46
Gold.....	24 08	86 00	45 20	30 20
Oats				
Banner.....	38 08	125 10	30 40	24 38
Dunbar.....	35 00	64 24	24 28	17 24
Victory.....	42 07	89 14	36 32	33 36
Peas				
Arthur.....		46 40	44 40	30 00
Chancellor.....		43 00	45 00	23 40
Golden Vire.....		29 00	48 00	20 60
Prussian Blue.....		27 00	55 40	23 20
Solo.....		27 40	47 40	30 10

Figures for the pea crop in 1915 are not available, through a sudden windstorm so entangling the different varieties while they were ripening in windrows, that it was impossible to determine the relative yields.

An experimental plot of one-fortieth-acre was sown with the new Liberty Hulless oat and yielded 980 pounds of grain to the acre. Further tests will be made with this interesting variety.

HORTICULTURE.

The work in this Division was considerably curtailed owing to war conditions, the variety tests for vegetables, other than potatoes, being practically suspended: experiments in various cultural methods were, however, carried out as in previous years.

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Seed Production.—To test the suitability of the district for seed production, small plots were sown with beet, carrot, parsnip, radish, lettuce, spinach and cabbage. In the case of roots, the stecklings were stored during the winter, and will be planted out in prepared ground in the spring.

Potatoes—Variety Test.—This test was continued with 45 varieties. The yields throughout were considerably in excess of the average and the proportion of marketable tubers was greater.

Potatoes—Irrigation Test.—The object of this experiment is to note the comparative effect upon the yield of potatoes of one irrigation during the season, two or more irrigations during the season, and no irrigation. The rows are 100 feet long by 2½ feet and the seed is dropped 12 inches apart.

The following table gives the comparative yields for the past four years.

Potatoes—Irrigation Test—Yields per 100-foot-row.

The varieties used are Sir Walter Raleigh, Wee McGregor and Conquering Hero. Plots received one dressing of farm manure.

	Plot A. No Irrigation.			Plot B. One Irrigation.			Plot C. Two or more Irrigations.		
	Sir W. Ral- eigh.	Wee Mc- Gregor.	Con- quering Hero.	Sir W. Ral- eigh.	Wee Mc- Gregor.	Con- quering Hero.	Sir W. Ral- eigh.	Wee Mc- Gregor.	Con- quering Hero.
1915.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Marketable.....	150	115	136	144	185	176	155	179	120
Unmarketable.....	54	64	60	63	80	83	45	81	68
Total.....	204	179	196	207	265	259	200	260	188
Total plot yield.....	579 lbs.			731			648		
1916.									
Marketable.....	120	85	136	120	88	148	119	118	132
Unmarketable.....	47	32	36	48	36	45	55	34	55
Total.....	167	117	172	168	124	193	174	152	187
Total plot yield.....	456 lbs.			485			513		
1917.									
Marketable.....	91	73	89	88	81	101	88	68	94
Unmarketable.....	20	19	28	22	24	23	26	21	25
Total.....	111	92	117	110	105	124	114	89	119
Total plot yield.....	320 lbs.			339			322		
1918.									
Marketable....	204	221	180	191	199	250	200	203	125
Unmarketable.....	36	22	22	20	22	25	25	21	21
Total.....	239	243	202	211	221	255	223	224	246
Total plot yield.....	682 lbs.			687			593		

The result of this test seems to point to the possibility of growing potatoes in this district without irrigation, provided the land is supplied with humus in the form of manure or of a crop ploughed under. The average yield from Plot B was 20 per cent higher than from Plot A, and further experiments may determine the amount of water it will be most profitable to apply.

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EXHIBITIONS.

The following fall fairs were attended: Invermere, Traill, Nelson, Creston and Nakusp. That the visits were appreciated at all points was evident, and the value of this work as a means of bringing the farmers into touch with the work of the Experimental Farms was again demonstrated.

MEETINGS ATTENDED.

In addition to being present at the above Fairs, and assisting in the judging at Creston and Nakusp, the Superintendent attended the following meetings and Conventions:—

District Farmers' Institute meeting at Cranbrook, the B.C. Seedgrowers Association and the Dairymen's Convention at Kelowna, the B.C. Fruitgrowers Association at Penticton, and the various meetings of the local Agricultural Association and Stockbreeders Association.

The Superintendent gave addresses at Nakusp and Cranbrook, and read a paper before the Annual Convention of the Western Canada Irrigation Association, held at Nelson.

NEW LAND AND DEVELOPMENTS.

In addition to the adjoining land acquired in 1917, of which approximately 10 acres have been broken and put under crop, a further plot of 2½ acres, with a house and small barn, has been added to the Station holdings.

A quantity of manure has been bought from a local livery stable, and has been applied to the new land during the winter, and shale, for the improvement of the roads and drives at the Station, has been hauled.

EXPERIMENTAL FARM, AGASSIZ, B.C.

REPORT OF THE OFFICER-IN-CHARGE, W. H. HICKS, B.S.A.

THE SEASON.

The total precipitation of 78.6 inches for the year 1918-19 was larger than average, being, however, .67 inches less than for the preceding year. April was the driest on record and afforded ideal conditions for getting the land in good tilth and the crops well sown. May was somewhat too dry and cool. Two degrees of frost were recorded on May 24th which slightly damaged tender garden crops. June was the driest for seven years with a mean temperature the highest for the same period. Conditions were improved somewhat in July but all crops still needed moisture. The following month was the wettest August on record. The large precipitation, along with warm, sultry, calm weather resulted in sprouted and badly discoloured cereal crops. September was the driest month of the year and the driest September for twelve years. Weather conditions were reversed again in October when 14.85 inches of rain fell, which is a record in October for twenty years. The three succeeding months were very wet, while February and March were about normal. The winter although wet was mild with very little snow, except for one storm the latter part of February.

The dry growing season resulted in decreased yields of practically all crops, especially roots, pasture, hay and cereals. The grain crops gave very disappointing yields and were badly weathered by the excessive rains in August. The hay, although light, was of good quality. Potatoes suffered badly from blight and dry rot and, like the root crop, were difficult to harvest in the wet month of October.

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METEOROLOGICAL RECORDS.

Month.	Temperature.					Precipitation.			
	Date.	Max.	Date.	Min.	Mean.	Rain.	Snow.	Total.	Sum.
1918.		°				Inches.	Inches.	Inches.	11.18.
April.....	19	78	4	29	49.58	1.38		1.38	202.4
May.....	12	75	24	30	52.64	4.64		4.64	160.7
June.....	20	83	1	39	61.05	1.74		1.74	198.6
July.....	17	94	13	41	64.2	2.28		2.28	180.9
August.....	10	86	21	35	62.04	7.94		7.94	158.8
September.....	27	90	20	59	66.21	0.29		0.29	127.4
October.....	19	66	23	59	51.09	14.85		14.85	77.8
November.....	8	52	24	25	42.63	8.46	6	9.06	77.8
December.....	4	50	31	24	38.95	12.59	8	13.39	56.0
1919.									
January.....	13	49	1	20	38.58	11.01		11.01	54.3
February.....	18	49	24	16	37.4	3.78	34	6.88	57.1
March.....	31	78	1	15	42.48	5.67	14	5.07	120.0

LIVE STOCK.

Horses.—There are on the Agassiz Farm ten work horses and one driver, also two mature Clydesdale mares in foal and three Clydesdale fillies, a three-year-old, two-year-old, and foal. The feed cost of maintaining horses increased greatly during the past year. The average feed cost per hour's work done by the heavy draft horses was 10.4 cents and for the light draft 9.77 cents.

Cattle.—The entire herd numbers eighty head, thirty-nine of them being pure-bred and forty-one grade Holsteins. Although the size of the herd has not increased the quality is much improved. A number of grade cows and heifers were sold to make room for the gradually increasing pure-bred herd. So far none of the latter females has been disposed of. The health of the herd has been good. Two tests for tuberculosis failed to detect a reaction. This makes the sixth successive year of freedom from this disease.

The average milk production for the twenty-nine cows finishing a lactation period during the year is 9,042.19 pounds for an average lactation of 333 days. This is an increase per cow of 669.79 pounds of milk over all previous years. Fifty per cent of the calves dropped by these cows were females. A number of good records were made, the best by the four-year-old cow Agassiz Pietje Korndyke, 6407. She gave 19,935 pounds of milk and 933.75 pounds of butter in 365 days under Record of Performance rules. The mature cow Aurora Mechthilde-9701, tested under the same rules, produced 19,271 pounds of milk and 818.75 pounds of butter in 325 days, and this following a record of 18,195 pounds of milk made last year. A few of the best individuals in the herd were exhibited at the Vancouver Exhibition and did very well in competition with other herds. Aurora Mechthilde won the Grand Championship for dairy females all ages and breeds, Second in the Senior herd class, First and Second for two animals from one dam, and a few other prizes as well were won in the Holstein classes by the herd in strong competitions.

Experimental feeding work with dairy cattle was continued as formerly. More interesting data on the comparative value of pea and oat, clover, and corn silage were secured. In other experiments, mangels produced a slightly cheaper product than carrots, crushed barley proved superior to corn meal, and good pasture gave better results than silage for milk and butter production. The cost of raising and maintaining all dairy animals increased over last year.

The manufacture of cheese followed much the same course as that of last year, namely, a regular weekly shipment of cream cheese to Vancouver and a more inter-

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mittent sale of Stilton and Camembert. During the year 350 pounds of Stilton at 40 cents per pound, 5,597 cream cheeses at 15 cents each, and 291 Camembert at 27 cents each, were sold. Camembert at this price yields a good profit since only five pounds of whole milk goes to the manufacture of each cheese and the labour entailed is small, but the demand for them is not so large nor so steady as for cream cheese. Record of Merit tests of seven and thirty days for seventeen cows of the herd were made. Milk samples have been tested for those farmers who cared to submit them and the regular weekly test for each cow of the herd was continued.

• *Sheep.*—Three rams and forty-four ewes of the Dorset Horned breed, one ram and five ewes of the Oxford Down breed, thirty-one grade ewes, and sixty-six spring lambs form the present flock. The sixty-six lambs are being raised by the forty-eight ewes. The entire flock was on pasture until February 23rd and from that date until March 31st the average feed cost per sheep amounted to \$3.48.

The 1918 wool clip totalled 518 pounds from 67 sheep, or an average of 7.73 pounds per fleece. It was sold co-operatively through the Vancouver Island Flockmasters' Association. All fleeces were top grade and brought 61 cents per pound net.

No fall lambs were raised this year but a Dorset ram lamb was born on January 6th and an Oxford on the 16th. The cost of feeding the dams and the lambs from then till the end of March amounted to \$15.22. The Dorset lamb weighed 76 and the Oxford 70 pounds on March 31st. They were excellent specimens of their respective breeds. Six thrifty February lambs were sold at Easter for \$16 each. The sheep grading experiment with the Dorset rams was continued with good results. A similar experiment, using an Oxford ram on the same ewes, was commenced with the intention of securing information on the relative merits of the two breeds for grading purposes.

A few of the best Dorset sheep were exhibited at Vancouver Exhibition and succeeded in winning the major honours in the Dorset classes, including Champion ram and Champion ewe.

Swine.—There are on hand at the end of the year 2 boars, 13 sows, 47 feeders, and 61 sucking pigs, all pure bred Yorkshires. Eighteen sows owned during the year farrowed 26 litters, with a total of 294 pigs, and raised 249 of them, or 84.7 per cent. This makes a total of 9.7 pigs per litter raised, which is an excellent average. Feeding 28 pigs for 110 days, comparing the self-feeder with the trough feeding method indicated greater and cheaper gains made by the trough fed lot, labour not included. In a comparison of barrow versus sow pigs for pork production, the cost of 100 pounds gain was 89 cents less with the barrows than the sow group. The returns from a field of peas harvested by hogs amounted to \$20.20 per acre. In comparing barley with Grade A screenings, the latter in one trial produced pork \$3.48 and in the other \$4.78 per 100 pounds cheaper than the barley. The barley was charged at \$60 per ton and the screenings at \$45. An attempt was made to arrive at the most economical amount of skim milk to feed young pigs averaging 44 pounds each. Lot 1 was given water, lot 2 four pounds of milk per pig per day, lot 3 six pounds of milk per pig per day, and lot 4 eight pounds per pig per day. All lots were fed what grain they would consume, lot 1 taking the most with a gradual decrease to lot 4. The average daily gain in each group increased as the amount of milk was increased. Charging grain at market price and skim milk at 50 cents per hundred pounds, the lot receiving the 6 pounds of milk per pig per day made the most economical gains.

POULTRY.

The kinds wintered here this season consisted of about 250 Barred Plymouth Rocks, 150 White Leghorns, and 3 White Wyandottes. Some very good winter records were obtained from each of the breeds. The three Wyandottes each laid over 60 eggs

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from November 1 to March 1. Fourteen Rocks and five Leghorns passed the 50-egg mark during the same time. These, with some others, are being pedigreed and are mated to males from over 230 record hens. All birds on the plant are trap-nested and only those showing high records are bred from. There have been a great many inquiries for hatching eggs, but, owing to a limited supply, all orders could not be filled. Day-old chicks were also asked for, but could not be supplied. Some customs hatching was done in the Candee incubator, which is giving good satisfaction. Last spring a Buckeye Colony brooder was purchased and is giving much greater satisfaction than the Candee brooder, being more sanitary, more economical in coal consumption and giving no trouble with the fire damping out.

As a protection for baby chicks against crows, a string covered yard was arranged in front of the brooder house. The strings were run about a foot apart from end to end of the yard, seven feet above the ground. This arrangement cost very little and was effective. Under this protection more chicks had to be culled, so apparently, in former seasons, the crows had been taking the weaklings.

Standard screenings were used as the main hopper feed for the growing chicks with fair results. As scratch feed they are unsatisfactory, but ground and used in the hopper mash make a good substitute for shorts.

The hatching results of confined versus free range birds showed two per cent higher fertility for the confined birds, both with hens and pullets, but the hatchability and livability was very low compared to the free range birds.

BEES.

The season's work commenced with five colonies. Two of these lost their queens in midsummer and deserted their hives. The three remaining colonies produced an average of 74 pounds of extracted honey. One hive was placed on the scales and a daily record kept of its loss or gain in weight.

FIELD HUSBANDRY.

Rotations.—The four-year rotation of hoed crop, grain, hay and pasture has been continued with increasingly good results. Each field is gradually being enlarged as more land is cleared, which permits the boundary fences to be pushed further back and in many instances straightened and squared. Previously the barnyard manure was applied for the hoe crop, but early this spring a light application was spread on the hay meadow, resulting in a splendid appearance of the field at present.

Crop yields.—The following table shows the amount of each crop grown in 1918:—

Crop.	Yield.	
	Tons.	Lbs.
Corn silage	103	1,725
Clover silage	127	1,600
Pea and oat silage	78	1,605
Clover hay	73	285
Green feed	31	760
Mangels	92	1,410
Carrots	4	1,850
Sugar beets....	1	1,225
Potatoes	10	600
Mixed grains	26	1,200
Oats	6	1,500
Peas	1	300
Barley		1,750

Cultural Experiments.—The cultural work was carried on as formerly on the 146 plots set aside for the purpose. The crop yields on all plots were very poor owing to the character of the season.

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FERTILIZER EXPERIMENTS.

A fertilizer experiment designated "E7" was started in 1918, the object being to get some information on the most economical combinations of different fertilizers to use on a three-year crop rotation. A great variation in yields of mangels was obtained. A permanent check plot which has not had manure or fertilizer for a number of years did not produce a single mangel, while some of the plots produced a crop of over twenty tons per acre. In almost every instance the heavier applications produced greater yields, but they were not always the most profitable. Whale guano did not produce as heavy crops nor as profitable crops of either corn or mangels as did nitrate of soda.

CEREALS.

The variety testing of cereals was continued on much the same plan as formerly. The plots were sown on April 20 and some of the early barley was harvested in July. Eleven varieties of oats were tested. The old favourites, Banner and Gold Rain, did very poorly. Victory and Lincoln were the best yielders with 66 bushels 6 pounds, and 65 bushels 10 pounds per acre respectively. The early varieties, Daubeny and Eighty-day, matured in 103 days, the former yielding slightly better than Eighty-day. Of the eleven barleys tested the six-row varieties did better than usual. Gold again headed the list, Duckbill Ottawa 57 being the second two-row variety; Oderbruck and O.A.C. No. 21 were the best six-rowed varieties. Of the six varieties of peas tested Solo was again the best yielder, followed by Golden Vine, Prussian Blue, Arthur, Chancellor and Picton. A mixture of Solo peas and Banner oats gave a better yield than Arthur peas and Banner oats.

FORAGE CROPS.

Root seed.—Extensive work in mangel steckling and mangel seed growing was accomplished. Two-thirds of an acre of Half Sugar White mangel seed was grown, the roots being set in rows three feet apart and planted eighteen inches apart in the rows. The amount of seed obtained was 1,200 pounds. One half an acre of Danish Sludstrup mangel seed was also produced from plants set three feet apart each way, the yield being 800 pounds. Twenty-four acres of the Yellow Leviathan variety of stecklings were also grown. This entailed a great deal of labour and expense, including rent of land, manual and horse labour, fertilizer and lumber. An excellent crop of stecklings was grown and at date of writing sufficient of them have been distributed to farmers in the Province to plant forty-four acres for seed. A large quantity is still on hand.

Roots.—Owing to the extra amount of labour in connection with root seed growing variety test work with forage crops was considerably reduced. Corn tests were eliminated entirely. Four varieties of mangels, three of carrots and five of sugar beets were tested. Giant Sugar mangel, Improved Short White carrot, and Ontario sugar beet proved to be the best yielding varieties.

Grasses and clovers.—The grass and clover mixtures sown in 1915 yielded only one crop. A mixture consisting of Red clover 9 pounds, Alsike three and a half, Dutch one and a half, Timothy one and a quarter, and Meadow Fescue one and a quarter pounds gave the best returns, followed by a mixture comprised of Red clover ten pounds and Alsike two pounds. The heaviest seeding of alfalfa gave the best results, while the lightest seeding yielded the poorest crops.

HORTICULTURE.

Following a milder winter than usual, the spring of 1919 was good for garden work and the land was well prepared for the ensuing season. The orchard and orna-

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mental trees and shrubs recovered somewhat from their hard usage of the winter ice storms of 1917. Rhododendron, azaleas, magnolias, hydrangeas and dogwoods blossomed freely and were much admired.

Fruits.—This was a very good small fruit year and, with the exception of the strawberries, all varieties, particularly currants, yielded large crops. Plums and cherries bore well and a few of the apple trees had small crops.

Vegetables.—The vegetable work consisted of the usual tests in growing potatoes in various ways both cultural and from seed sprouted, unsprouted and cut, and variety test of potatoes.

The rest of the vegetable work was confined to growing seed and a quantity of seed was grown from the annual vegetables, and roots for seed growing in the following year were grown and harvested and have since been replanted for bearing seed in 1919.

Flowers.—Roses were exceptionally fine. The very dry June favoured the flowering and did not produce any mildew as might have been expected. Perennials bloomed well and the annuals were good, particularly those grown from seed raised at the Experimental Station at Summerland, B.C. Very little seed could be saved however owing to the very wet weather in the autumn.

FARM IMPROVEMENTS.

Buildings.—The old gangway at the rear of the main barn was removed and a new and more substantial one was erected in its place, having cement bases with plank platform. The main barn and Superintendent's house were painted.

Fencing.—The usual repair work and transferring of temporary fences was done, no permanent fences being erected.

Land Clearing.—The three acres of land stumped and cleared last year were levelled and ploughed in time to plant to peas and oats for green feed. After this crop was harvested it afforded considerable pasture for the sheep. Two more acres of underbrushing and one more acre of stumping were done at odd times during the year. Approximately one acre of new land was put into shape for cropping.

EXHIBITIONS.

The travelling exhibit from this farm was shown at only one local fair during the season, Matsqui. A large exhibit of cattle and sheep was shown at Vancouver Fair, which assisted greatly in the advertising of the work of the farm in British Columbia and elsewhere.

MEETINGS.

The writer attended the following Fairs and meetings: Vancouver Board of Trade "Get Together" meeting, Dr. Williams lecture, Essondale, Annual Meeting of British Columbia Holstein Friesian, Duncan; Vancouver Exhibition, Mosquito Convention, Mission; Chilliwack School Garden Competition; Sheep sale, Kamloops; Annual Meeting Chilliwack Agricultural Society; Dairymen's Convention, Kelowna; Seed Grower's Convention, Kelowna; Annual Meeting Westminster Fair Association; Fraser Valley Seed Grower's Meeting, Chilliwack; Calgary and Edmonton Spring Horse Shows.

VISITORS.

It is estimated that 2,000 people visited the Farm during the year.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND, B.C.

REPORT OF THE SUPERINTENDENT, LIONEL STEVENSON, M.S.

SEASONAL NOTES.

The climatic conditions experienced during the year were favourable to crop production with one exception, the lack of sufficient moisture during the April to September period to give an average yield. The soil dried quickly and the spring seeding completed three weeks earlier than in 1917, was followed by cool, dry weather. The autumn-seeded crops which suffered considerable by heaving during February, 1918, were slow in making recovery. Corn and roots did not develop well. Permanently established, deep-rooted plants withstood the soil dryness with but little injury. The experience of the year points more strongly than ever towards autumn seeding and specializing in permanently established plantations where such can be operated. More autumn-sown fodder crops and grains, more loganberries and strawberries and more thorough orchard practice are recommended for this district.

METEOROLOGICAL RECORDS.

Month.	Temperature F.			Precipitation.				Sunshine.
	Mean.	Highest.	Lowest.	Rainfall.	Snowfall.	Total.	Highest in 24 Hours.	
1918.				Inches.	Inches.	Inches.	Inches.	Hours.
April	47.5	69.0	31.0	0.21		0.21	0.16	255.48
May	52.1	75.0	35.0	0.44		0.44	0.14	244.30
June	60.5	82.0	37.0	0.45		0.45	0.22	317.18
July	62.5	84.0	44.0	0.96		0.96	0.26	287.06
August.....	60.5	77.0	45.0	1.41		1.41	0.30	256.30
September..	59.0	81.0	41.0	0.16		0.16	0.16	223.54
October	49.9	64.0	39.0	2.73		2.73	0.73	103.48
November..	42.8	54.0	32.0	3.34		3.34	0.63	49.06
December.....	38.8	51.0	29.0	6.77		6.77	2.34	59.18
1919.								
January...	39.5	52.0	28.0	4.45		4.45	0.87	43.18
February.....	33.4	51.0	26.0	3.76	2.60	4.02	0.71	60.00
March	41.9	62.0	29.0	3.17	2.50	3.42	0.82	130.30
Total for year.....				27.85	5.10	28.36		2,020.06
Average for year						2.36		169.25

LIVE STOCK.

Horses.—Four work geldings are kept and are used exclusively for land tillage and Station improvement work. These horses have been maintained in good condition through the year on the following ration, April to September 30, for each 100 pounds weight of horse, 1 pound of crushed oats, 4 ounces of wheat bran and 1 pound of mixed clover and timothy hay were fed, from October 1 to January 31, rye hay was used, and from February 1 to March 31 oat straw was used instead of mixed or rye hay. These horses worked through the year at regular farm work or teaming gravel or stone.

Cattle.—The Jersey herd established in December, 1916, has been maintained in good condition. The herd was twice subjected to the tuberculin test and no reactions were found on either occasion. Only one cow exceeded the 400-pound fat standard set

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for the herd. The heifers sired by the herd bull, a son of Rosalind of Old Basing, have not developed as satisfactorily as we had hoped for. The demand for young bulls has not been active, females were in good demand. The last two calves born were females.

Swine.—One choice Berkshire sow was added to the live-stock equipment early in the year. Six very fine young Berkshires were reared, four of which were sold for breeding purposes.

Poultry.—The work in the poultry department was largely a continuation of the preceding year's plan. Good progress has been made in pedigree breeding and high standards attained. The breeding pens are headed by cockerels having mothers with egg records of 257 and 261 eggs in the pullet year. Provision has been made to keep up and increase the present high egg-laying standard of the flock. Costs of production in the various operations were obtained. All birds have been trapnested throughout the year. Fertility experiments relating to individual fowls have been instituted. Four makes and types of incubators have been under observation and record. Considerable stock was sold for breeding purposes or transferred to other Stations. A heavy demand for hatching eggs and breeding stock was experienced during the year.

Apiary.—The colonies wintered in case-covered hives on their summer stand. Coming through the previous winter in good condition, the bees started early and gathered a surplus averaging 50 pounds per hive. This was the largest yield in five years. The honey was disposed of in the extracted condition. The result of the past five years' apiary work indicate that island conditions do not favour extensive bee-keeping.

FIELD EXPERIMENTS.

Rotations.—The following rotations are under test:—

Two-year—Oats, peas, vetch for hay or silage-clover.

Three-year—Oats, sweet clover and vetch-beans.

Four-year—Corn, wheat, clover, clover.

Four-year—Oats, peas and vetch for silage, wheat or oats, clover, clover.

Crop Yields.—The total area in grain including test plots was 29 acres. Autumn wheat yields varied with varieties and locations from a minimum of 21½ bushels to a maximum of 24 bushels in test plots, with a field average of 19½ bushels.

CEREALS.

Spring wheat yields in the test plots were very low owing to the dry, cold weather of April and the continued drought for the remainder of the growing season, the yields varied from 655 pounds to 775 pounds per acre. The straw was uniformly short with all varieties. The Marquis variety headed the list for productiveness.

Peas.—All legumes do well in the district and the pea varieties gave a better average under the adverse weather conditions than did any other class of cereals. Yields varied from 815 pounds to 1,245 pounds per acre. The Solo variety headed the list for productiveness.

Oats.—The autumn-sown crops yielded the heaviest in spite of the fact that 50 per cent of the plants winter-killed. O. A. C. 72, autumn-sown, yielded 1,015 pounds; spring-sown 680 pounds per acre and other varieties showed equal variation in yield.

Of the autumn-sown varieties, the Eclipse, a favourite Californian oat, headed the list of winter oats with a yield of 1,165 pounds per acre. The Ottawa Liberty Hulless is a very promising winter oat for this district.

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Spring-sown varieties, nine in number, gave yields much below normal and varying from 460 pounds to 680 pounds per acre.

Rye.—The rye plots suffered greatly from spring heaving. Yields were very low, varying from 495 to 460 pounds per acre. Thousand-fold has proved to be the best yielder over a period of five years.

Autumn Wheat.—Of the eleven varieties of autumn-sown wheats under test, Sun headed the list with Dawson's Golden Chaff second. Marquis and Blue Stem made excellent showing as autumn wheats. Yields varied from 1,490 pounds to 2,360 pounds per acre.

Barley.—Two types were under test in both autumn and spring sown plots. Beardless and hulless varieties only were used. The autumn-sown plots were much superior to the spring plots. Yields were low.

The following classes of grains were tested in regular test plot work:—

	Number of Varieties.	Head of List.
Winter wheats.....	Eleven varieties.....	Sun.
Spring wheats.....	Nine.....	Marquis.
Winter barley.....	Four.....	Blue Hulless.
Spring barley.....	Three.....	Blue Hulless.
Winter peas.....	Three.....	Solo.
Spring peas.....	Five.....	Solo.
Winter oats.....	Five.....	Eclipse.
Spring oats.....	Nine.....	O. A. G. 72.
Winter rye.....	Four.....	Thousand Fold.
Vetch and tares..	One.....	Golden Tares.

Cereal Breeding.—This work was started in 1916. Numerous crosses were made chiefly in wheats during 1918. The results of crosses made in 1916 and 1917 have been multiplied greatly by the reproduction of two seasons. Numerous head selections have been made.

FORAGE PLANTS.

Indian Corn.—Three varieties were under test as grain producers, all giving very satisfactory results. Palisade (the Experimental Station hybrid) gave a yield of 4,256 pounds of shelled corn per acre. King Philip 3,847 pounds per acre and Morse Hybrid Flint 3,718 pounds per acre. But one variety (Experimental Station hybrid) was tested for ensilage—height 9 to 12 feet—yield 11 tons 525 pounds per acre; ripened in 131 days.

Roots.—An attempt was made to grow stecklings of Danish Sludstrup mangel; this was only partly successful owing to dry weather. Sufficient stecklings were produced to set two acres for seed production.

Mangels in seed were very successful. The stocks were set in October and seventy-five per cent wintered. These developed well and produced an excellent crop of high quality seed. The yield per acre was 2,600 pounds.

Carrot stecklings for seed production were set in October. These roots wintered without loss and gave a seed yield of 1,150 pounds per acre. An area of select Thousand-headed kale plants gave a seed yield of 2,425 pounds per acre. Experience of past years indicate that greater average results will be obtained from those root seed plants that are hardy enough to winter than may be expected from the spring planting of stecklings.

Alfalfa withstood the drought conditions better than any other plant. The best plot seeded in drills 20 inches apart gave a total yield in three crops of 11,132 pounds of

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dry hay per acre. Four alfalfa varieties are under test. Distance of planting tests have been conducted during the past two years.

Swiss Chard.—A small area planted in April and irrigated at regular fifteen-day intervals during the season gave a green weight yield of 32,625 pounds per acre. These plants will be used for seed production in 1919.

Sugar Beets.—Four varieties were under test. The variety Ontario headed the list with a yield of 12 tons 355 pounds per acre. Helianthi Macrophyllum, the Australian artichoke, was established on a small area. A yield of 17,743 pounds per acre was taken on August 16. A second growth 15 inches high was recorded. Plots of Red, White, Alsike, Sweet and Egyptian clovers, Cocksfoot Tall oat grass and timothy were under test. Many varieties of grasses and clovers were discarded as being unsuited to island conditions. Only those varieties that can withstand a long period of dryness can be successful on the upland areas.

HORTICULTURE.

The orchards made very satisfactory growth during the year. A number of trees of the various kinds produced heavy crops of fruit and nuts. A mulching system has been introduced and for some years will be the orchard practice. In April the orchard area was seeded with peas and red clover. The green pea vine was cut in June and placed about the trees as a mulch. A very good stand of clover was obtained; this will be cut in June, 1919 and 1920 and used as a mulch. The orchard will be ploughed and reseeded every third year. The practice of clean cultivation has proven to be destructive of soil fertility in this district of wet, open winters and dry summer periods.

A number of useful apple seedlings have been located. A number of crosses between standard varieties of apples and pears have been made. Sour and Sweet cherries, plums, quinces, medlars and pears of excellent quality were ripened by numbers of various varieties. Apples, peaches, nectarines, apricots, were produced in abundance but of only fair quality. Very satisfactory yields were obtained from a large variety of bush and cane fruits. The strawberry, the loganberry and the black currant are the outstanding classes of small fruits for the district.

The production of vegetable seed received considerable attention throughout the season and splendid results were obtained both in the production of seed and the growing of stecklings.

The development of the various plantations of economics including holly, cascara, tea, eleagnus, filberts, persimmon and grapes was very satisfactory.

The nursery has been maintained and extended by small plantings of those varieties best suited to the district. Plant propagation has been largely confined to broadleaf evergreen shrubs and roses.

Twelve sample hedges were planted during January as a beginning on the hedge area.

The holly orchard and perennial flowering plants were moved from their location of 1917 to the ornamental grounds.

The arboretum progressed to the extent of a fair natural growth and a few conifer instructions. Many of the introduced deciduous shrubs and trees have not proven very vigorous under the intense dryness of the summer period in this district. All broadleaf evergreens, conifers and legumes do well here. The work with flowering bulbs was carried on as usual throughout the year. An area one-quarter acre in extent was treated with a two-inch coating of sand to improve tilth conditions for bulb growing. The bulb increases have been generally satisfactory for thin and medium varieties. The park shrubbery and trees made very satisfactory growth.

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BUILDINGS.

Some repair work and painting was done to the existing structures. A small building 20 feet by 26 feet was erected for horticultural work and a silo 9 feet by 27 feet for experimental silage was erected.

FARM IMPROVEMENTS.

The removal of stones and roots from the fields, road improvement by gravelling and ditching and fence improvement received considerable attention throughout the year.

EXHIBITIONS.

The following exhibitions were supplied with the Station exhibit: Cowichan Agricultural Society, North and South Saanich Agricultural Society, Provincial Seed Fair at Kelowna, and a contribution toward a general exhibit at the Vancouver Exhibition.

MEETINGS ATTENDED.

The superintendent attended and acted as judge of exhibits at the following fairs and exhibitions: South Saanich, North Saanich, West Saanich, Garden City, Tillicum flower and garden produce exhibitions. The Cowichan Agricultural Society Exhibition, the Nanaimo Agricultural Society Fair, the North and South Saanich Agricultural Society Exhibition, the Vancouver Exhibition, and the provincial seed fairs at Kelowna and Duncan.

The superintendent attended by invitation and delivered addresses at the following organizations' meetings; Farmers' and Womans' Institutes, Board of Trade, Greater Production, Dairymen's Convention, Seed Growers' Convention and meetings and short course in agronomy at University of British Columbia.

VISITORS.

Many large picnic parties visited the station during July and August. Numerous individual visitors from various parts of Canada and the United States called, seeking information relative to local conditions. The estimated aggregate of all visitors for the year is 3,400 people.





